START

Superfund Technical Assessment and Response Team
- Region VIII

United States
Environmental Protection Agency

Contract No. 68-W5-0031

APPENDIX D and APPENDIX E (CD ROM)

APPENDIX D - Analytical Data and Validation Reports

APPENDIX E - Data Ram And Meteorological Monitoring Data Files (Cd Rom)

FOR REMOVAL SUMMARY REPORT

VASQUEZ BOULEVARD AND I-70 SITE
Denver, Colorado

TDD No. 9809-0014

DECEMBER 23, 1998

URS
OPERATING SERVICES, INC.

TOPSOIL ANALYTICAL RESULTS

CASE NARRATIVE
November 19, 1998

Client:	URS Operating Services, Inc.
Project:	75.80914.00
Date Rec'd:	10/15/98
SDG#:	L20715
Lab Nos.:	L20715-01 through L20715-03

Three samples for this SDG were received on 10/15/98. The samples were received in good condition. These samples were then logged into ACZ's LIMS as projects L20715.

The samples for this SDG were analyzed for the parameters outlined in the scope of work attached with the Chain of Custody documentation. The list contained inorganic parameters.

The data package is separated into four (4) sections as follows:

- Invoice and Case Narrative
- Inorganic Analytical Reports
- QC Summaries
- Chain of Custody Documentation

Items of note for this project:

This set of samples meets ACZ's data quality objectives.

If you have any questions please do not hesitate to call me at (800) 334-5493.

Scott Gustin, Project Manager

rec'd 11-23-98 FK

COPY

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20715-01*
Client Sample ID: *VB-A1-1*
Client Project ID: *75.80914.00*
ACZ Report ID: *RG79615*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Karen Kuoppula

Date Sampled: *10/13/98 14:00*
Date Received: *10/15/98*
Date Reported: *10/22/98*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, total (3051)	M6010B ICP	35400		mg/Kg	4	20	10/16/98	kr
Antimony, total (3051)	M7041 GFAA		U	mg/Kg	0.3	1	10/17/98	jb
Arsenic, total (3051)	M7060 GFAA	6.5		mg/Kg	0.6	3	10/16/98	jb
Barium, total (3051)	M6010B ICP	244		mg/Kg	0.4	1	10/16/98	kr
Beryllium, total (3051)	M6010B ICP	1.0		mg/Kg	0.3	1	10/16/98	kr
Cadmium, total (3051)	M7131 GFAA	0.52		mg/Kg	0.06	0.3	10/17/98	jb
Calcium, total (3051)	M6010B ICP	26700		mg/Kg	30	100	10/16/98	kr
Chromium, total (3051)	M6010B ICP	22		mg/Kg	1	6	10/16/98	kr
Cobalt, total (3051)	M6010B ICP	8		mg/Kg	1	6	10/16/98	kr
Copper, total (3051)	M6010B ICP	31		mg/Kg	1	6	10/16/98	kr
Iron, total (3051)	M6010B ICP	21300		mg/Kg	1	6	10/16/98	kr
Lead, total (3051)	M7421 GFAA	16.8		mg/Kg	0.5	3	10/16/98	jb
Magnesium, total (3051)	M6010B ICP	4880		mg/Kg	30	100	10/16/98	kr
Manganese, total (3051)	M6010B ICP	382		mg/Kg	0.6	1	10/16/98	kr
Mercury, total	M7471 CVAA	0.07	B	mg/Kg	0.02	0.1	10/20/98	ss
Nickel, total (3051)	M6010B ICP	22		mg/Kg	1	6	10/16/98	kr
Potassium, extractable (AB-DTPA)	M6010B ICP	320		mg/Kg	20	50	10/20/98	gg
Potassium, total (3051)	M6010B ICP	3650		mg/Kg	40	100	10/16/98	kr
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.6		mg/Kg	0.1	0.6	10/21/98	kr
Silver, total (3051)	M7761 GFAA	0.32		mg/Kg	0.06	0.3	10/16/98	jb
Sodium, total (3051)	M6010B ICP	200		mg/Kg	40	100	10/16/98	kr
Thallium, total (3051)	M7841 GFAA		U	mg/Kg	0.3	1	10/17/98	jb
Vanadium, total (3051)	M6010B ICP	37.0		mg/Kg	0.6	3	10/17/98	kr
Zinc, total (3051)	M6010B ICP	91		mg/Kg	1	6	10/16/98	kr

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Conductivity @25C	M120.1 - Meter, w/ Saturated Paste Prep	1.820		mmhos/cm	0.001	0.01	10/16/98	cc
Organic Matter	USDA No.60 - Method 24	2.71		%	0.01	0.1	10/16/98	sw
pH, Saturated Paste	USDA No. 60 (21A)	7.8		units	0.1	0.1	10/16/98	cc
Sieve- 2000 um (2.0 mm)	ASA No.9 15-4.2.2	73.0		% Passing	0.1	0.5	10/16/98	cjv
Sieve-22400 um (7/8")	ASA No.9 15-4.2.2	100		% Passing	0.1	0.5	10/16/98	cjv
Solids, Percent	CLPSOW390, PART F, D-98	78.2		%	0.1	0.5	10/15/98	vv

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

R V Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20715-01*
Client Sample ID: *VB-A1-1*
Client Project ID: *75.80914.00*
ACZ Report ID: *RG79615*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Karen Kuoppula

Date Sampled: *10/13/98 14:00*
Date Received: *10/15/98*
Date Reported: *10/22/98*

Sample Matrix: *Soil*

Texture by Hydrometer	ASTM D 422 Hydrometer						
Clay		20	%	1	5	10/16/98	cc
Sand		56	%	1	5	10/16/98	cc
Silt		24	%	1	5	10/16/98	cc
Texture Classification		SL-SCL				10/16/98	cc

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
AB-DPTA Extraction	ASA No. 9, 3-5.2.3						10/16/98	cjv
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/98	vv
Digestion - Microwave	M3051, HNO3						10/16/98	cjv
Saturated Paste Extraction	USDA No. 60 (2)						10/16/98	cjv
Water Extraction	ASA No. 9 10-2.3.2						10/16/98	cjv

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Nitrate as N, soluble (Water)	Calculation: NO3NO2 minus NO2	28.2		mg/Kg	0.5	3	10/22/98	calc
Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	32.9		mg/Kg	0.5	3	10/17/98	ss
Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	4.69		mg/Kg	0.05	0.3	10/17/98	ss
Phosphorus, extractable (AB-DTPA)	M365.1 - Automated Ascorbic Acid	23		mg/Kg	1	5	10/17/98	ss

Note: The Antimony, Cadmium and Silver analyses were performed using method of standard additions. The Silver value is estimated due to matrix interferences.

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20715-02*
Client Sample ID: *VB-A1-2*
Client Project ID: *75.80914.00*
ACZ Report ID: *RG79616*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Karen Kuoppula

Date Sampled: *10/13/98 14:08*
Date Received: *10/15/98*
Date Reported: *10/22/98*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, total (3051)	M6010B ICP	33800		mg/Kg	4	20	10/16/98	kr
Antimony, total (3051)	M7041 GFAA		U	mg/Kg	0.5	3	10/17/98	jb
Arsenic, total (3051)	M7060 GFAA	5.4		mg/Kg	0.6	3	10/16/98	jb
Barium, total (3051)	M6010B ICP	288		mg/Kg	0.4	1	10/16/98	kr
Beryllium, total (3051)	M6010B ICP	1.1		mg/Kg	0.3	1	10/16/98	kr
Cadmium, total (3051)	M7131 GFAA	0.58		mg/Kg	0.06	0.3	10/17/98	jb
Calcium, total (3051)	M6010B ICP	20700		mg/Kg	30	100	10/16/98	kr
Chromium, total (3051)	M6010B ICP	20		mg/Kg	1	6	10/16/98	kr
Cobalt, total (3051)	M6010B ICP	10		mg/Kg	1	6	10/16/98	kr
Copper, total (3051)	M6010B ICP	71		mg/Kg	1	6	10/16/98	kr
Iron, total (3051)	M6010B ICP	22200		mg/Kg	1	6	10/16/98	kr
Lead, total (3051)	M7421 GFAA	21.8		mg/Kg	0.6	3	10/16/98	jb
Magnesium, total (3051)	M6010B ICP	5060		mg/Kg	30	100	10/16/98	kr
Manganese, total (3051)	M6010B ICP	1320		mg/Kg	0.6	1	10/16/98	kr
Mercury, total	M7471 CVAA	0.04	B	mg/Kg	0.03	0.1	10/20/98	ss
Nickel, total (3051)	M6010B ICP	17		mg/Kg	1	6	10/16/98	kr
Potassium, extractable (AB-DTPA)	M6010B ICP	420		mg/Kg	20	50	10/20/98	gg
Potassium, total (3051)	M6010B ICP	4050		mg/Kg	40	100	10/16/98	kr
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.7		mg/Kg	0.1	0.6	10/21/98	kr
Silver, total (3051)	M7761 GFAA	0.7		mg/Kg	0.1	0.6	10/16/98	jb
Sodium, total (3051)	M6010B ICP	430		mg/Kg	40	100	10/16/98	kr
Thallium, total (3051)	M7841 GFAA		U	mg/Kg	0.5	3	10/17/98	jb
Vanadium, total (3051)	M6010B ICP	46.8		mg/Kg	0.6	3	10/17/98	kr
Zinc, total (3051)	M6010B ICP	116		mg/Kg	1	6	10/16/98	kr

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Conductivity @25C	M120.1 - Meter, w/ Saturated Paste Prep	1.300		mmhos/cm	0.001	0.01	10/16/98	cc
Organic Matter	USDA No.60 - Method 24	5.09		%	0.01	0.1	10/16/98	sw
pH, Saturated Paste	USDA No. 60 (21A)	7.7		units	0.1	0.1	10/16/98	cc
Sieve- 2000 um (2.0 mm)	ASA No.9 15-4.2.2	64.5		% Passing	0.1	0.5	10/16/98	cjv
Sieve-22400 um (7/8")	ASA No.9 15-4.2.2	100		% Passing	0.1	0.5	10/16/98	cjv
Solids, Percent	CLPSOW390, PART F, D-98	77.9		%	0.1	0.5	10/15/98	vv

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20715-02*
Client Sample ID: *VB-A1-2*
Client Project ID: *75.80914.00*
ACZ Report ID: *RG79616*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Karen Kuoppula

Date Sampled: *10/13/98 14:08*
Date Received: *10/15/98*
Date Reported: *10/22/98*

Sample Matrix: *Soil*

Texture by Hydrometer	ASTM D 422 Hydrometer						
Clay		6	%	1	5	10/16/98	cc
Sand		81	%	1	5	10/16/98	cc
Silt		13	%	1	5	10/16/98	cc
Texture Classification		LS				10/16/98	cc

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
AB-DPTA Extraction	ASA No. 9, 3-5.2.3						10/16/98	cjv
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/98	vv
Digestion - Microwave	M3051, HNO3						10/16/98	cjv
Saturated Paste Extraction	USDA No. 60 (2)						10/16/98	cjv
Water Extraction	ASA No. 9 10-2.3.2						10/16/98	cjv

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Nitrate as N, soluble (Water)	Calculation: NO3NO2 minus NO2	11.5		mg/Kg	0.1	0.5	10/22/98	calc
Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	12.8		mg/Kg	0.1	0.5	10/17/98	ss
Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	1.31		mg/Kg	0.05	0.3	10/17/98	ss
Phosphorus, extractable (AB-DTPA)	M365.1 - Automated Ascorbic Acid	43		mg/Kg	1	5	10/17/98	ss

Note: The Antimony, Cadmium and Silver analyses were performed using method of standard additions. The Silver value is estimated due to matrix interferences.

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

QC Report ID: QC2046-D

ACZ Project ID: L20715

REPORT TO:

Karen Kuoppula
URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Monday, November 16, 1998

Bradley W. Craig, Quality Assurance Officer — Date: 11.19.98

Scott Gustin, Project Manager — Date: 11-19-98

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20987-01*
Client Sample ID: *VB-SP-1VS*
Client Project ID: *75.80914.00*
ACZ Report ID: *RG81096*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Kent Alexander

Date Sampled: *10/23/98 15:10*
Date Received: *11/4/98*
Date Reported: *11/12/98*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Conductivity @25C	M120.1 - Meter, w/ Saturated Paste Prep	2.380		mmhos/cm	0.001	0.01	11/9/98	vv
Organic Matter	USDA No.60 - Method 24	4.03		%	0.01	0.1	11/9/98	as
pH, Saturated Paste	USDA No. 60 (21A)	7.7		units	0.1	0.1	11/9/98	vv
Sieve- 2000 um (2.0 mm)	ASA No.9 15-4.2.2	56.8		% Passing	0.1	0.5	11/6/98	vv
Sieve-22400 um (7/8")	ASA No.9 15-4.2.2	100		% Passing	0.1	0.5	11/6/98	vv
Solids, Percent	CLPSOW390, PART F, D-98	83.2		%	0.1	0.5	11/5/98	as
Texture by Hydrometer	ASTM D 422 Hydrometer							
Clay		10		%	1	5	11/11/98	as
Sand		53		%	1	5	11/11/98	as
Silt		37		%	1	5	11/11/98	as
Texture Classification		SL/L					11/11/98	as

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
AB-DPTA Extraction	ASA No. 9, 3-5.2.3						11/9/98	vv
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/5/98	as
Saturated Paste Extraction	USDA No. 60 (2)						11/9/98	vv
Water Extraction	ASA No. 9 10-2.3.2						11/9/98	vv

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Nitrate as N, soluble (Water)	Calculation: NO3NO2 minus NO2	42.0		mg/Kg	0.5	3	11/12/98	calc
Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	42.5		mg/Kg	0.5	3	11/10/98	ss
Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	0.48		mg/Kg	0.05	0.3	11/10/98	ss
Phosphorus, extractable (AB-DTPA)	M365.1 - Automated Ascorbic Acid	16		mg/Kg	1	5	11/12/98	ss

Note: Duplicate precision for Conductivity and Nitrate/Nitrite exceeds ACZ's QC limit.

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

R V Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20987-02*
Client Sample ID: *VB-SP-1S*
Client Project ID: *75.80914.00*
ACZ Report ID: *RG81097*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Kent Alexander

Date Sampled: *10/23/98 15:15*
Date Received: *11/4/98*
Date Reported: *11/12/98*

Sample Matrix: *Soil*

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Conductivity @25C	M120.1 - Meter, w/ Saturated Paste Prep	2.610		mmhos/cm	0.001	0.01	11/9/98	vv
Organic Matter	USDA No.60 - Method 24	3.85		%	0.01	0.1	11/9/98	as
pH, Saturated Paste	USDA No. 60 (21A)	7.7		units	0.1	0.1	11/9/98	vv
Sieve- 2000 um (2.0 mm)	ASA No.9 15-4.2.2	99.7		% Passing	0.1	0.5	11/6/98	vv
Sieve-22400 um (7/8")	ASA No.9 15-4.2.2	100		% Passing	0.1	0.5	11/6/98	vv
Solids, Percent	CLPSOW390, PART F, D-98	81.5		%	0.1	0.5	11/5/98	as
Texture by Hydrometer	ASTM D 422 Hydrometer							
Clay		10		%	1	5	11/11/98	as
Sand		55		%	1	5	11/11/98	as
Silt		35		%	1	5	11/11/98	as
Texture Classification		SL					11/11/98	as

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
AB-DPTA Extraction	ASA No. 9, 3-5.2.3						11/9/98	vv
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/5/98	as
Saturated Paste Extraction	USDA No. 60 (2)						11/9/98	vv
Water Extraction	ASA No. 9 10-2.3.2						11/9/98	vv

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Nitrate as N, soluble (Water)	Calculation: NO3NO2 minus NO2	72.0		mg/Kg	0.5	3	11/12/98	calc
Nitrate/Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	72.5		mg/Kg	0.5	3	11/10/98	ss
Nitrite as N, soluble (Water)	M353.2 - Automated Cadmium Reduction	0.50		mg/Kg	0.05	0.3	11/10/98	ss
Phosphorus, extractable (AB-DTPA)	M365.1 - Automated Ascorbic Acid	18		mg/Kg	1	5	11/12/98	ss

Note: Duplicate precision for Conductivity and Nitrate/Nitrite exceeds ACZ's QC limit.

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20861-01*
Client Sample ID: *VB-SP-1US*
Client Project ID: *Vasquez Blvd*
ACZ Report ID: *RG80219*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Karen Kuoppula

Date Sampled: *10/23/98 15:10*
Date Received: *10/24/98*
Date Reported: *10/29/98*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, total (3051)	M6010B ICP	26700		mg/Kg	4	20	10/28/98	gg
Antimony, total (3051)	M7041 GFAA		U	mg/Kg	0.2	1	10/28/98	bg
Arsenic, total (3051)	M7060 GFAA	5.9		mg/Kg	0.5	2	10/27/98	jb
Barium, total (3051)	M6010B ICP	192		mg/Kg	0.4	1	10/28/98	gg
Beryllium, total (3051)	M6010B ICP	0.8	B	mg/Kg	0.2	1	10/28/98	gg
Cadmium, total (3051)	M7131 GFAA	0.8		mg/Kg	0.1	0.6	10/28/98	bg
Calcium, total (3051)	M6010B ICP	21000		mg/Kg	20	100	10/28/98	gg
Chromium, total (3051)	M6010B ICP	18		mg/Kg	1	6	10/28/98	gg
Cobalt, total (3051)	M6010B ICP	6		mg/Kg	1	6	10/28/98	gg
Copper, total (3051)	M6010B ICP	26		mg/Kg	1	6	10/28/98	gg
Iron, total (3051)	M6010B ICP	17200		mg/Kg	1	6	10/28/98	gg
Lead, total (3051)	M7421 GFAA	23.0		mg/Kg	0.5	2	10/28/98	bg
Magnesium, total (3051)	M6010B ICP	4420		mg/Kg	20	100	10/28/98	gg
Manganese, total (3051)	M6010B ICP	340		mg/Kg	0.6	1	10/28/98	gg
Mercury, total	M7471 CVAA	0.03	B	mg/Kg	0.02	0.1	10/28/98	bg
Nickel, total (3051)	M6010B ICP	18		mg/Kg	1	6	10/28/98	gg
Potassium, total (3051)	M6010B ICP	3310		mg/Kg	40	100	10/28/98	gg
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.5	B	mg/Kg	0.1	0.6	10/28/98	bg
Silver, total (3051)	M7761 GFAA	0.29	B	mg/Kg	0.06	0.3	10/28/98	jb
Sodium, total (3051)	M6010B ICP	200		mg/Kg	40	100	10/28/98	gg
Thallium, total (3051)	M7841 GFAA	0.3	B	mg/Kg	0.2	1	10/28/98	bg
Vanadium, total (3051)	M6010B ICP	31.2		mg/Kg	0.6	3	10/28/98	gg
Zinc, total (3051)	M6010B ICP	93		mg/Kg	1	6	10/28/98	gg

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Solids, Percent	CLPSOW390, PART F, D-98	83.6		%	0.1	0.5	10/27/98	cc

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion - Microwave	M3051, HNO3						10/27/98	sw

Note: Duplicate precision for Chromium and Vanadium exceeds ACZ's QC limit of 20% RPD. The Silver analysis was performed using method of standard additions. The Silver value is estimated due to matrix interferences.

COPY

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

R V Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L20861-02*
Client Sample ID: *VB-SP-1S*
Client Project ID: *Vasquez Blvd*
ACZ Report ID: *RG80220*

URS Operating Services, Inc.
1099 18th Street Suite 710
Denver, CO 80202-1908
Karen Kuoppula

Date Sampled: *10/23/98 15:15*
Date Received: *10/24/98*
Date Reported: *10/29/98*

Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, total (3051)	M6010B ICP	26800		mg/Kg	4	20	10/28/98	gg
Antimony, total (3051)	M7041 GFAA		U	mg/Kg	0.2	1	10/28/98	bg
Arsenic, total (3051)	M7060 GFAA	6.2		mg/Kg	0.5	2	10/27/98	jb
Barium, total (3051)	M6010B ICP	197		mg/Kg	0.4	1	10/28/98	gg
Beryllium, total (3051)	M6010B ICP	0.8	B	mg/Kg	0.2	1	10/28/98	gg
Cadmium, total (3051)	M7131 GFAA	0.4	B	mg/Kg	0.1	0.6	10/28/98	bg
Calcium, total (3051)	M6010B ICP	22600		mg/Kg	20	100	10/28/98	gg
Chromium, total (3051)	M6010B ICP	16		mg/Kg	1	6	10/28/98	gg
Cobalt, total (3051)	M6010B ICP	7		mg/Kg	1	6	10/28/98	gg
Copper, total (3051)	M6010B ICP	27		mg/Kg	1	6	10/28/98	gg
Iron, total (3051)	M6010B ICP	16500		mg/Kg	1	6	10/28/98	gg
Lead, total (3051)	M7421 GFAA	22.3		mg/Kg	0.5	2	10/28/98	bg
Magnesium, total (3051)	M6010B ICP	4370		mg/Kg	20	100	10/28/98	gg
Manganese, total (3051)	M6010B ICP	357		mg/Kg	0.6	1	10/28/98	gg
Mercury, total	M7471 CVAA	0.04	B	mg/Kg	0.02	0.1	10/28/98	bg
Nickel, total (3051)	M6010B ICP	18		mg/Kg	1	6	10/28/98	gg
Potassium, total (3051)	M6010B ICP	3110		mg/Kg	40	100	10/28/98	gg
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.4	B	mg/Kg	0.1	0.6	10/28/98	bg
Silver, total (3051)	M7761 GFAA	0.42		mg/Kg	0.06	0.3	10/28/98	jb
Sodium, total (3051)	M6010B ICP	200		mg/Kg	40	100	10/28/98	gg
Thallium, total (3051)	M7841 GFAA	0.3	B	mg/Kg	0.2	1	10/28/98	bg
Vanadium, total (3051)	M6010B ICP	28.1		mg/Kg	0.6	3	10/28/98	gg
Zinc, total (3051)	M6010B ICP	87		mg/Kg	1	6	10/28/98	gg

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Solids, Percent	CLPSOW390, PART F, D-98	82.3		%	0.1	0.5	10/27/98	cc

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion - Microwave	M3051, HNO3						10/27/98	sw

Note: Duplicate precision for Chromium and Vanadium exceeds ACZ's QC limit of 20% RPD. The Cadmium and Silver analyses were performed using method of standard additions. The Silver value is estimated due to matrix interferences.

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

PARTICULATE FILTER CASSETTE ANALYTICAL RESULTS

300 UNION BOULEVARD, SUITE 600, LAKEWOOD, CO 80228

TECHLAW INC.

PHONE: (303) 763-7188
FAX: (303) 763-4896

December 21, 1998

Ms. Lori Raschke
URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202

RE: Transmittal of Data Validation Reports
Vasquez and I-70
TDD No. 75-80914
Report Nos. 98-10-306, 98-10-234, 983003, and 302114

Dear Ms. Raschke:

Please find the enclosed data validation reports for TDD No. 75-80914 for the Vasquez and I-70 project. These reports are for the validation of metals (arsenic, cadmium, and lead) analyses by SW-846 methods.

If you have any questions regarding the enclosed reports, please contact me at (303) 763-7188.

Yours sincerely,
TECHLAW, INC.

Lisa Burnley
Associate Consultant

enclosure
IF: 0252-167

REGION VIII
SUMMARY OF DATA QUALITY ASSURANCE REVIEW
INORGANIC

TDD No.	Site Name		Operable Unit
75-80914	Vasquez & I-70		
RPM/OSC Name			
Pete Stevenson			
Contractor Laboratory	**Contract No.**	**Report No.**	**Laboratory DPO/Region**
Paragon Analytics, Inc.	OS-98-P-5459	98-10-306	

Review Assigned Date December 2, 1998 Data Validator Bill Fear
Review Completion Date December 21, 1998 Report Reviewer Amy Ballow

Sample ID	Laboratory ID	Matrix	Analysis
4940STN-10-22	9810306-1	Filter	Metals (Arsenic, Cadmium, and Lead) by SW-846 Method 6010
4940STS-10-22	9810306-2		
4940STE-10-22	9810306-3		
4771VI-WEST	9810306-4		
4771VI-SOUTH	9810306-5		
4771VI-EAST	9810306-6		
4771VI-EAST D	9810306-7		

DATA QUALITY STATEMENT

( ) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
(X) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes _____ No ___X_____

TPO Attention Required? Yes _____ No ___X_____ If yes, list the items that require attention:

INORGANIC DATA QUALITY ASSURANCE REVIEW

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, modified for the method used. Qualification taken on sample results based on the Functional Guidelines that differ from method requirement are identified within the report.

The data package TDD No.75-80914, Report No. 9810306, consisted of seven filter samples for arsenic, cadmium, and lead analyses by SW-846 Method 6010.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
98-10-306-1, 98-10-306-3, 98-10-306-6	Lead	UJ	Negative blank contamination	VII
98-10-306-2, 98-10-306-4, 98-10-306-5, 98-10-306-7		J		

Method/SOW Number SW-846, Method 6010
Revision 0.0

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets
P Initial Calibration and Calibration Verification Results
P Continuing Calibration Verification Results
NA CRDL Standard for ICP and AA
P Blank Analysis Results
P ICP Interference Check Sample Results
P Spiked Sample Results
NA Post-digest spiked Sample Analysis
P Duplicate Sample Results
P Instrument Detection Limits
P Laboratory Control Sample results
NA Standard Addition Results
P ICP Serial Dilution Results
NA Holding Times Summary Sheet
P ICP Interelement Correction Factors
P ICP Linear Ranges
P Raw Data

P Samples	P Calibration Standards	P Blanks	P Spikes
P Duplicates	P ICP QC (ICS and Serial Dilution	P LCS	
NA Furnace AA	NA Mercury Analysis	NA Cyanide Analysis	

NA Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs
P Analysis Run Log
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required by the SOW
R = Provided as Resubmission
NP = Not provided in original data package or as resubmission
NR = Not required under the SOW
NA = Not applicable to this data package or analysis

I. DELIVERABLES

All deliverables were present.

Yes_X_ No___

Comments: None.

II. HOLDING TIMES AND PRESERVATION CRITERIA

All holding times and preservations criteria were met.

Yes___ No_X_

Comments: The samples were analyzed within holding times; however, the temperature at the time of sample receipt was not recorded. No action was taken.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to requirements.

Yes_X_ No___

Comments: None.

The instruments were calibrated daily and each time an analysis run was performed.

Yes_X_ No___

Comments: None.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes_X_ No___

Comments: None.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes_X_ No___

Comments: None.

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met requirements.

Yes_X_ No___

Comments: None.

The calibration verification results were within 90-110% recovery for metals, 85-115% for cyanide, and 80-120% for mercury.

Yes_X_ No___

Comments: None.

The continuing calibration standards were run at 10% frequency.

Yes_X_ No___

Comments: None.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes_X_ No___

Comments: A CRDL standard was not required for method 6010.

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes___ No___ NA_X_

Comments: None.

The CRI and/or the CRA were analyzed after the ICV.

Yes___ No___ NA_X_

Comments: None.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met requirements.

Yes_X_ No___

Comments: None.

The continuing calibration blanks were run at 10% frequency.

Yes_X_ No___

Comments: Continuing calibration blanks were run every 10 samples.

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes_X_ No___

Comments: None.

All analyzed blanks were free of contamination.

Yes___ No_X_

Comments: The following table lists the blanks with contamination, elements present, affected samples, and data qualifiers.

Blank Contaminants

Blank ID	Date	Contaminant	Concentration Found in Blank (ug/filter)	IDL (ug/L)	Associated Samples	Concentration Found in Sample (ug/filter)	Qualifier/ Adjustment
PB	11/03/98	Lead	-0.186	1.0	98-10-306-1 98-10-306-3 98-10-306-6	0.1 U	UJ
					98-10-306-2 98-10-306-4 98-10-306-5 98-10-306-7	0.19 0.13 0.12 0.11	J

For negative blank contamination, detected sample results less than 5 times the absolute value of the blank were qualifed as estimated (J) and non-detected results were qualified as estimated (UJ).

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes_X_ No___

Comments: None.

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes_X_ No___

Comments: Arsenic, cadmium, and lead recoveries from the ICSAB solution were within QC criteria. ICSA data were not required for method 6010.

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: Because these samples are filters and only one filter for each sample was provided the laboratory could not perform a pre-digestion spike. Therefore, the post digestion spikes are evaluated as a pre-digestion spike.

The percent recoveries (%R) were calculated correctly.

$$\%\ Recovery = \frac{(SSR - SR)}{SA} X\ 100$$

SSR = spiked sample result
SR = sample result
SA = spike added

Yes_X_ No___

Comments: None.

Spike recoveries were within the range of 75-125% (an exception is granted where the sample concentration is four times the spike concentration).

Yes_X_ No___

Comments: None.

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., Pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes___ No___ NA_X_

Comments: Post digestion spikes were evaluated as the matrix spikes.

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes___ No_X_

Comments: Duplicate data were performed using a laboratory control sample duplicate due to insufficient sample size. (One filter per sample.)

The RPDs were calculated correctly.

$$RPD = \frac{(S - D)}{(S + D)/2} \times 100$$

S = sample
D = duplicate

Yes_X_ No___

Comments: None.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes_X_ No___

Comments: None.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes_X_ No___

Comments: None.

XII. GFAA QC

Duplicate injections were performed on all GFAA samples and the RSD was within ± 20%.

Yes___ No___ NA_X_

Comments: None.

Analytical spikes were performed on all GFAA samples and the percent recovery was 85 - 115%.

Yes___ No___ NA_X_

Comments: None.

MSAs were analyzed when required and the correlation coefficient was > 0.995.

Yes___ No___ NA_X_

Comments: None.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

All results were within control limits.

Yes_X_ No___

Comments: None.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII.

Yes___ No___ NA_X_

Comments: None.

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes_X_ No___

Comments: None.

The serial dilution was without interference problems.

Yes_X_ No___

Comments: None.

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for all elements on the target analyte list.

Yes_X_ No___

Comments: None.

Reported IDLs met requirements.

Yes_X_ No___

Comments: None.

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes_X_ No___

Comments: The interelement corrections provided were obtained more than a year prior to sample analysis. No action was required.

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes_X_ No___

Comments: None.

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of ± 5% of the true value.

Yes___ No___ NA_X_

Comments: None.

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported on Form XIII.

Yes_X_ No___

Comments: None.

XXI. FORM 14 - ANALYSIS RUN LOG

A Form XIV with the required information was filled out for each analysis run in the data package.

Yes_X_ No___

Comments: None.

XXII. Additional Comments or Problems/Resolutions Not Addressed Above

Yes_X_ No___

Comments: Only the results for arsenic, camium, and lead were reported on the Form 1s for the metal analyses.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both INORGANIC and ORGANIC DATA

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940STN

Lab Name: PARAGON_ANALYTICS Contract:

Lab Code: NA Case No.: SAS No.: SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-1

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	0.30	U		P	
7440-43-9	Cadmium	0.02	U		P	
7439-92-1	Lead	0.10	U		P	UJ

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FULL_CLIENT_SAMPLE_ID_IS_4940STN-10-22.

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940STS

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-2

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.19	B		P

J

RE 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

FULL_CLIENT_SAMPLE_ID_IS_4940STS-10-22.

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940STE

Lab Name: PARAGON_ANALYTICS Contract:

Lab Code: NA Case No.: SAS No.: SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-3

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

UJ

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FULL_CLIENT_SAMPLE_ID_IS_4940STE-10-22.

FORM I - IN

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4771VI-WEST

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-4

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	0.30	U		P	
7440-43-9	Cadmium	0.02	U		P	
7439-92-1	Lead	0.13	B		P	J

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

FORM I - IN

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4771VI-SOUTH

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-5

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.12	B		P

J

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

FORM I - IN

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4771VI-EAST

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-6

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

UJ

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

FORM I - IN

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4771VI-EASTD

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810306-7

Level (low/med): LOW Date Received: 10/30/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.11	B		P

J

12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

FORM I - IN

TECHLAW, INC.

VERSIO
SEPT

I METAL ANALYSIS WORKSHEET--HOLDING TIMES

BATCH: 98-10-306

List all analytes which do not meet holding time criteria

URS-

SAMPLE ID	Matrix	PRE-SERVED Y/N	DATE COLLECTED	METALS ANALYSIS DATE/S	Hg CVAA ANALYSIS DATE	CN ANALYSIS DATE	_____ ANALYSIS DATE/S	NO. OF DAYS PAST HOLDING TIME	ACTI
1	Filter	NO	10-22-98	11-3-98 ✓				-0-	
2									
3									
4			10-21-98						
5									
6									
7									

Round

COMMENTS Cd, As, Pb only Temp not specified ✓

Actions:

1. If holding times are exceeded, all sample results are estimated (J)/(UJ).
2. If holding times are grossly exceeded (>= 2*holding time), detected results are estimated (J), and non-detected results are rejected (R).

Validated By: Date:

Bill Fe 12-14-98

Reviewed By: Date:

Amy Ballow 12-17-98

ANALYTE	HOLDING TIME	PRESERVATIVE	
		AQUEOUS	SOIL
Metals	180 days	pH < 2 w/HNO3, 4 Deg C	4 Deg C
Mercury	28 days	pH < 2 w/HNO3, 4 Deg C	4 Deg C
Cyanide	14 days	pH > 12 w/NaOH, 4 Deg C	4 Deg C

Holding Time = Analysis Date - Collection Date

met1/techlaw/policy7

TECHLAW, INC.

VERSION 2.0
SEPT. 1996

IIA METAL ANALYSIS WORKSHEET -- ICP CALIBRATIONS

BATCH: 98-10-304

List all ICP analytes that did not meet the percent recovery criteria for initial calibration verification (ICV) and continuing calibration verification (CCV).

ANALYTE	ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED
	All	w/	90 -110%			none

Was a CRDL check sample (CRI) analyzed at the beginning and at the end of each sample run? Yes No NA - 6010

COMMENTS

Actions:

ICV/CCV Actions:

	PERCENT RECOVERY				
	<75%	75-89%	90-110%	111-125%	>125%
Detected results	R	J	V	J	R
Non-detected Results	R	UJ	V	V	V

1. If the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).

TECHLAW, INC.

VERSION
SEPT. 19

IIB METAL ANALYSIS WORKSHEET -- AA CALIBRATIONS

BATCH: _____

List all AA analytes that did not meet the percent recovery criteria for initial calibration verification (ICV) and continuing calibration verification (CCV).

ANALYTE	ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED

1. Were the correct number of standards and blanks used to calibrate the instrument? Yes No
2. Is the initial calibrations correlation coefficient > 0.995? Yes No
   If no, list effected analytes and samples.
3. Was a CRDL check sample (CRA) analyzed at the beginning of each sample run? Yes No

COMMENTS

Actions:

ICV/CCV Actions:

	PERCENT RECOVERY				
	<75%	75-89%	90-110%	111-125%	>125%
Detected results	R	J	V	J	R
Non-detected Results	R	UJ	V	J	R

1. If three standards and a blank were not used for initial calibration, or the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).
2. If the initial calibration correlation coefficient was less than 0.995, qualify sample results as estimated (J or UJ).

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VERSION 2
SEPT. 19

IIC METAL ANALYSIS WORKSHEET -- Hg CALIBRATIONS

BATCH: ________

List all mercury results that did not meet the percent recovery criteria for the ICV and/or CCV standards.

ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED

1. Were the correct number of standards and blanks used to calibrate the instrument? Yes No

2. Is the initial calibration correlation coefficient > 0.995? Yes No

If no, list affected samples:

3. Was a CRDL check sample (CRA) analyzed at the beginning of each sample run? Yes No

COMMENTS

Actions:

	PERCENT RECOVERY				
	<65%	65-79%	80-120%	121-135%	>135%
Detected results	R	J	V	J	R
Non-detected results	R	UJ	V	V	V

1. If four standards and a blank were not used for initial calibration, or the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).
2. If the initial calibration correlation coefficient was less than 0.995, qualify sample results as estimated (J)/(UJ).

TECHLAW, INC.

VERSION 2
SEPT. 199

IID METAL ANALYSIS WORKSHEET -- CN CALIBRATIONS

BATCH: _____

List all cyanide results that did not meet the percent recovery criteria for the ICV and/or CCV standards.

ICV CCV	TRUE	FOUND	%R	ACTION	SAMPLES AFFECTED

1. Were the correct number of standards and blanks used to calibrate the instrument? Yes No
2. Is the initial calibration correlation coefficient > 0.995? Yes No
   If no, list affected samples:
3. Was a mid-range calibration standard and an ICV distilled? Yes No
   If no, list affected samples:

COMMENTS

Actions:

	PERCENT RECOVERY				
	<70%	70-84%	85-115%	116-130%	>130%
Detected results	R	J	V	J	R
Non-detected results	R	UJ	V	V	V

1. If three standards and a blank were not used for initial calibration or the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).
2. If the initial calibration correlation coefficient was less than 0.995, qualify samples results as estimated (J)/(UJ).
3. If a mid-range standard (or ICV) was not distilled, qualify sample results as estimated (J)/(UJ).

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VERSION 2.
SEPT. 199

III METAL ANALYSIS WORKSHEET -- BLANKS

MATRIX: filter BATCH: 98-10-304

List the highest positive AND negative blank result >= |IDL| below. Use one worksheet for soil matrix and another for water matrix.

ANALYTE	ICB CCB PB/MB	ug/L IDL	BLANK CONC.	5 * Bl. Conc.	ACTION	SAMPLES AFFECTED
Pb	PB3	1.0	-0.166	-0.93	UJ	1,3,6
			ug/filter		J	2,4,5,7

NOTE: Verify that the absolute value of any analyte concentration in the PB or MB is < CRDL.

COMMENTS

Actions:

1. If |Blank| < IDL, no action is taken.
2. If Blank > = IDL, then all sample results > = IDL and < 5*Blank are non-detected (U).
3. If Blank = < -IDL, all sample results > = IDL and < 5*|Blank| are estimated (J).
4. If Blank = < -IDL and raw data sample result is = < IDL then non-detected results are estimated (UJ).

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VERSION 2.0
SEPT. 199

IVA METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: _____

NOTE: The sample results can be accepted without qualification, if the sample concentrations of Al, Ca, Fe, and Mg are less than or equal to the concentration found in the ICSA solution.

Examine the sample results in ug/l and list any Al, Ca, Fe, or Mg results that are greater than the ICSA values.

SAMPLE ID	ANALYTE	SAMPLE RESULT	ICS VALUE	COMMENTS

List any analytes in the ICS AB solution that did not meet the criteria of 80-120% R.

ANALYTE	% R	ACTION	SAMPLES AFFECTED
	w/ 80-120%.		

Were Interference Check Samples run at the beginning and end of each sample analysis run, or a minimum of twice per 8-hour shift (whichever is more frequent)? (Yes) No

COMMENTS

Actions:

	PERCENT RECOVERY			
	<50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

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VERSION 2.0
SEPT. 1996

IVB METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: 98-70-306

Report the concentration of any analytes detected in the ICSA solution > |IDL| that should not be present

ANALYTE	ICSA RESULT	ACTION	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT

Not required for 6010

Actions:

If the ICSA value > the positive IDL:
1. For non-detected results, no action is taken.
2. Estimate (J) all detected results <= 5*ICSA.

If the ICSA value < -IDL:
1. Estimate (J) detected results <= 5*|ICSA|.
2. Estimate (UJ) non-detected results.

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VERSION
SEPT. 1

V METAL ANALYSIS WORKSHEET -- PRE-DIGESTION MATRIX SPIKE

MATRIX: Filter BATCH: FB-10-306

List all parameters that do not meet the percent recovery criteria. Note: The pre-digestion spike recovery criteria are not evaluated for Ca, Mg, K, Na, Al, and Fe for soil samples, and Ca, Mg, K, and Na for water samples. If the sample result exceeds the spike added by a factor of 4 or more, no action is taken.

SAMPLE ID	ANALYTE	SPIKED SAMPLE RESULT	SAMPLE RESULT	SPIKE ADDED	% R	ACTION	SAMPLES AFFECTED

1. Was a pre-digestion matrix spike prepared at the required frequency of once every 20 samples, or every SDG (whichever is more frequent)? Yes No As post due to filter (Sample ✓

2. Was a post-digestion matrix spike analyzed for all ICP elements, except Silver, that did not meet the pre-digestion matrix spike recovery criteria? Yes No NA post used as spike ✓

COMMENTS

1. If any analyte does not meet the % R criteria, qualify all associated samples using the following criteria:

Actions:

	Percent Recovery			
	<30%	30-74%	75-125%	>125%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

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VERSION 2.0
SEPT. 1996

VI METAL ANALYSIS WORKSHEET -- LABORATORY DUPLICATES

MATRIX: Solid

BATCH: 96-10-304

List all parameters that do not meet % difference or CRDL criteria.

SAMPLE ID	ANALYTE	SAMPLE VALUE	DUP. VALUE	RPD	DIFFERENCE	ACTION	SAMPLES AFFECTED
	LCS	LCSD		RPDs	< 20%	✓	

COMMENTS

LCS / LCSD ~~[illegible]~~ Sample size due to

Actions:

1. AQUEOUS

If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 20%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > CRDL, estimate (J)/(UJ) all sample results of the same matrix.

2. SOLID

If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 35%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > 2*CRDL, estimate (J)/(UJ) all sample results of the same matrix.
*Difference = |Sample result – Duplicate sample result|

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VERSION 2.0
SEPT. 1996

VII METAL ANALYSIS WORKSHEET--LABORATORY CONTROL SAMPLES

MATRIX: Filter BATCH: 96-10-304

List all parameters that do not meet the percent recovery criteria.

LCS ID	ANALYTE	TRUE VALUE	FOUND VALUE	%R	ACTION	SAMPLES AFFECTED
	All within limits					✓

COMMENTS

Actions:

Exception: antimony and silver have no control limits. An aqueous LCS is not required for CN and mercury.

	PERCENT RECOVERY			
1. AQUEOUS LCS	<50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

2. SOLID LCS

	BELOW CONTROL LIMITS	WITHIN CONTROL LIMITS	ABOVE CONTROL LIMITS
Detected results	J	V	J
Non-detected results	UJ	V	V

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VERSION 2.0
SEPT. 1996

VIIIA METAL ANALYSIS WORKSHEET -- ANALYTICAL SPIKE ANALYSIS

BATCH: ____________

List all samples whose analytical spike recovery did not meet the 85-115 % recovery criteria.

ANALYTE	SAMPLE ID	SAMPLE RESULT	SPIKED SAMPLE RESULT	TRUE SPIKE VALUE	%R	ACTION	COMMENT
						N/A	

1. Spike Recovery: One point analytical spikes were performed for all GFAA samples? Yes No

COMMENTS

If the sample result is <50% of the spike result, or the sample result is >50% of the spike result* and the percent recovery is <40% or between 85-115%, the following apply.

Actions:	<10%	10-84%	85-115%	>115%
	PERCENT RECOVERY			
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

*Spike result = |spiked sample result - sample result|

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VERSION 2.0
SEPT. 1996

VIIIB METAL ANALYSIS WORKSHEET -- FURNACE AA ANALYSIS

BATCH: _____

If the sample result is >= 50% of the spike result and the percent recovery was between 40-84% or >115%, then MSA must be performed.

List all samples for which an MSA analysis was required but not performed, or MSA results were outside control limits.

ANALYTE	SAMPLE ID	1st. CORR. COEFF.	2nd. CORR. COEFF.	ACTION	COMMENT

Actions:

1. Estimate (J) if an MSA was required and not performed.
2. If the correlation coefficient was <0.995, the MSA should be performed a second time. Estimate (J) all sample results if a reanalysis was not performed, or the reanalysis correlation coefficient was < 0.995, or result from the highest correlation coefficie was not reported.

List all samples > CRDL whose duplicate injections did not agree within 20% RSD or CV, or samples in which duplicate injections were not performed

ANALYTE	SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	%RSD or CV	CRDL	ACTION	COMMENT

*Spike result = |spiked sample result - sample result|

Actions:

1. Estimate (J) detected results greater than the CRDL if duplicate injections are outside 20% RSD.
2. Estimate (J) all sample results if duplicate injections were not performed.

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VERSION 2.0
SEPT. 1990

IX METAL ANALYSIS WORKSHEET -- ICP SERIAL DILUTION ANALYSIS

MATRIX: Filter

BATCH: 9870-364

Serial dilution criteria only applies if the original sample result is at least 50*DL and %D >10%.

ANALYTE	IDL	50*DL	SAMPLE RESULT	SERIAL DILUTION RESULT	% D	ACTION	SAMPLES AFFECTED
	none out						

INDUCTIVELY COUPLED PLASMA SERIAL DILUTION ANALYSIS:

Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis. (Yes) No

Serial dilutions were not performed for the following:

COMMENTS no hits

Actions:

Estimate (J) detected results if %D is > 10%.

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VERSION 2.0
SEPT. 199

X METAL ANALYSIS WORKSHEET -- SAMPLE RESULT VERIFICATION

BATCH: _____

1. Describe any raw data anomalies (i.e. baseline shifts, negative absorbances, transcription or calculation errors, legibility, etc.)

None

2. List results that fall outside the linear range of the ICP instrument or the calibrated range of the AA or Cyanide instrument, and were not reanalyzed.

None

3. Were ICP linear ranges obtained within 3 months of, and preceding, the sample analyses? - (Yes) No NA

4. Were ICP interelement corrections obtained within 12 months of, and preceding, the sample analyses? Yes (No) NA

just over 12 months

5. Were instrument detection limits present, found to be less than or equal to the CRDL, and obtained within 3 monts of, and preceedin the sample analyses? (Yes) No NA

6. Were all sample results reported down to the IDL? (Yes) No

7. Were sample weights, volumes, percent solids, and dilutions used correctly when reporting the results? Yes No

COMMENTS

As.: 3 ug/L $\times \frac{0.1\,L}{1\,Filter} =$ 0.3 ug/Filter

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10
Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA_61E_4___ Date: 10/15/98

Flame AA ID Number : _____

Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Arsenic	189.04		10	3.0	P
Cadmium	226.50		5	0.2	P
Lead	220.35		3	1.0	P

Comments:

U.S. EPA - CLP

11A
ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Arsenic	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.50	0.0000000	0.0000000	0.0000600	0.0000000	0.0000000
Lead	220.35	0.0003640	-0.0000130	0.0000630	0.0000110	0.0000000

Comments:

U.S. EPA - CLP

11B

ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	U__
Arsenic	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Cadmium	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.35	-0.0018800	0.0000000	0.0001820	0.0002430	0.0010640

Comments:

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11B
ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E 4___ Date: 10/15/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : V__	___	___	___	___
Arsenic	189.04	0.0000000				
Cadmium	226.50	0.0000000				
Lead	220.35	0.0000000				

Comments:

FORM XI (Part 2) - IN

U.S. EPA - CLP

12
ICP LINEAR RANGES (QUARTERLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E 4___ Date: 10/15/98

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Arsenic	15.00	10000.0	P
Cadmium	15.00	10000.0	P
Lead	15.00	10000.0	P

Comments:

U.S. EPA - CLP

13
PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:VASQUE

Method: P_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
4771VI-__	11/02/98	1.00	100
4771VI-__	11/02/98	1.00	100
4771VI-__	11/02/98	1.00	100
4771VI-__	11/02/98	1.00	100
4940STE__	11/02/98	1.00	100
4940STN__	11/02/98	1.00	100
4940STS__	11/02/98	1.00	100
LCSS __	11/02/98	1.00	100
LCSSD __	11/02/98	1.00	100
PBS __	11/02/98	1.00	100

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U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:VASQUE

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 11/03/98 End Date: 11/03/98

EPA Sample No.	D/F	Time	% R	Analytes																								
				AS	CD	PB																						
MIX	1.00	1042		X	X	X																						
MIX	1.00	1044		X	X	X																						
ICV	1.00	1048		X	X	X																						
ICB	1.00	1054		X	X	X																						
ZZZZZZ	1.00	1057																										
ICSA	1.00	1100		X	X	X																						
ICSAB	1.00	1103		X	X	X																						
CCV	1.00	1106		X	X	X																						
CCB	1.00	1112		X	X	X																						
ZZZZZZ	1.00	1115																										
ZZZZZZ	1.00	1118																										
ZZZZZZ	1.00	1124																										
ZZZZZZ	1.00	1127																										
ZZZZZZ	5.00	1130																										
ZZZZZZ	1.00	1132																										
ZZZZZZ	1.00	1135																										
ZZZZZZ	1.00	1140																										
ZZZZZZ	1.00	1143																										
ZZZZZZ	1.00	1145																										
CCV	1.00	1148		X	X	X																						
CCB	1.00	1152		X	X	X																						
ZZZZZZ	1.00	1154																										
ZZZZZZ	1.00	1158																										
ZZZZZZ	1.00	1202																										
ZZZZZZ	1.00	1205																										
ZZZZZZ	1.00	1208																										
ZZZZZZ	1.00	1211																										
ZZZZZZ	5.00	1214																										
ZZZZZZ	1.00	1217																										
ZZZZZZ	1.00	1222																										
CCV	1.00	1227		X	X	X																						
CCB	1.00	1232		X	X	X																						

FORM XIV - IN

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14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:VASQUE

Instrument ID Number: TJA 61E 4____ Method: P_

Start Date: 11/03/98 End Date: 11/03/98

EPA Sample No.	D/F	Time	% R	Analytes																										
				AS	CD	PB																								
ZZZZZZ	1.00	1235																												
ZZZZZZ	1.00	1238																												
ZZZZZZ	1.00	1241																												
CCV	1.00	1244		X	X	X																								
CCB	1.00	1249		X	X	X																								
CCV	1.00	1558		X	X	X																								
CCB	1.00	1601		X	X	X																								
PBS	1.00	1604		X	X	X																								
LCSS	1.00	1607		X	X	X																								
LCSSD	1.00	1610		X	X	X																								
4940STN	1.00	1614		X	X	X																								
4940STNL	5.00	1617		X	X	X																								
4940STNA	1.00	1620		X	X	X																								
4940STS	1.00	1623		X	X	X																								
4940STE	1.00	1626		X	X	X																								
4771VI-W	1.00	1629		X	X	X																								
4771VI-S	1.00	1632		X	X	X																								
CCV	1.00	1635		X	X	X																								
CCB	1.00	1638		X	X	X																								
4771VI-E	1.00	1641		X	X	X																								
4771VI-E	1.00	1644		X	X	X																								
ZZZZZZ	1.00	1647																												
ICSA	1.00	1650		X	X	X																								
ICSAB	1.00	1653		X	X	X																								
CCV	1.00	1656		X	X	X																								
CCB	1.00	1701		X	X	X																								

FORM XIV - IN

REGION VIII
SUMMARY OF DATA QUALITY ASSURANCE REVIEW
INORGANIC

TDD No.	Site Name		Operable Unit
75-80914	Vasquez & I-70		
RPM/OSC Name			
Pete Stevenson			
Contractor Laboratory	**Contract No.**	**Report No.**	**Laboratory DPO/Region**
Paragon Analytics, Inc.	OS-98-P-5459	98-10-234	

Review Assigned Date December 2, 1998 Data Validator Bill Fear
Review Completion Date December 21, 1998 Report Reviewer Amy Ballow

Sample ID	Laboratory ID	Matrix	Analysis
2000 47 N	9810234-1	Filter	Metals (Arsenic, Cadmium, and Lead) by SW-846 Method 6010
2000 47 E	9810234-2		
2000 47 S	9810234-3		
4691 V1 N	9810234-4		
4691 V1 E	9810234-5		
4691 V1 S	9810234-6		
4691 V1 N	9810234-7		
4691 V1 E	9810234-8		
4691 V1 S	9810234-9		
4691 V1 N	9810234-10		
4691 V1 E	9810234-11		
4691 V1 S	9810234-12		
4711 TH E	9810234-13		

Sample ID	Laboratory ID	Matrix	Analysis
4711 TH S	9810234-14	Filter	Metals (Arsenic, Cadmium, and Lead) by SW-846 Method 6010
4711 TH N	9810234-15		
4940 ST S	9810234-16		
4940 ST N	9810234-17		
4940 ST E	9810234-18		
4940 ST N	9810234-19		
4940 ST S	9810234-20		
4940 ST E	9810234-21		

DATA QUALITY STATEMENT

( ) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
(X) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes _____ No ___X___

TPO Attention Required? Yes _____ No ___X___ If yes, list the items that require attention:

INORGANIC DATA QUALITY ASSURANCE REVIEW

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, modified for the method used. Qualification taken on sample results based on the Functional Guidelines that differ from method requirement are identified within the report.

The data package TDD No.75-80914, Report No. 9810234, consisted of 21 filter samples for arsenic, cadmium, and lead analyses by SW-846 Method 6010.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
98-10-234-3, 98-10-234-10	Cadmium	U	Blank contamination	VII
98-10-234-21	Lead			

Method/SOW Number SW-846, Method 6010
Revision 0.0

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets
P Initial Calibration and Calibration Verification Results
P Continuing Calibration Verification Results
NA CRDL Standard for ICP and AA
P Blank Analysis Results
P ICP Interference Check Sample Results
P Spiked Sample Results
NA Post-digest spiked Sample Analysis
P Duplicate Sample Results
P Instrument Detection Limits
P Laboratory Control Sample results
NA Standard Addition Results
P ICP Serial Dilution Results
NA Holding Times Summary Sheet
P ICP Interelement Correction Factors
P ICP Linear Ranges
P Raw Data

P Samples	P Calibration Standards	P Blanks	P Spikes
P Duplicates	P ICP QC (ICS and Serial Dilution	P LCS	
NA Furnace AA	NA Mercury Analysis	NA Cyanide Analysis	

NA Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs
P Analysis Run Log
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required by the SOW
R = Provided as Resubmission
NP = Not provided in original data package or as resubmission
NR = Not required under the SOW
NA = Not applicable to this data package or analysis

I. DELIVERABLES

All deliverables were present.

Yes___ No_X_

Comments: Prior to submittal for data validation, the laboratory was requested to provide new sample Form 1s with the results reported to the IDLs. (Results were originally reported to the CRDL.) However, the laboratory did not provide a new Form 10 showing the correct IDLs. A Form 10 with correct IDLs was found in SDG 98-10-306. Additionally, new Form 3s for blank contamination in which blank results were reported to the IDL were not provided. The blanks were evaluated to the IDL during validation using the raw data. Refer to the blank section of this data validation report for action taken.

II. HOLDING TIMES AND PRESERVATION CRITERIA

All holding times and preservations criteria were met.

Yes___ No_X_

Comments: The samples were analyzed within holding times. However, according to the case narrative, the samples were received at 17°C. Based on professional judgement, no action was taken.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to requirements.

Yes_X_ No___

Comments: None.

The instruments were calibrated daily and each time an analysis run was performed.

Yes_X_ No___

Comments: None.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes_X_ No___

Comments: None.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes_X_ No___

Comments: None.

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met requirements.

Yes_X_ No___

Comments: None.

The calibration verification results were within 90-110% recovery for metals, 85-115% for cyanide, and 80-120% for mercury.

Yes_X_ No___

Comments: None.

The continuing calibration standards were run at 10% frequency.

Yes_X_ No___

Comments: None.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes_X_ No___

Comments: A CRDL standard was not required for method 6010.

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes___ No___ NA_X_

Comments: None.

The CRI and/or the CRA were analyzed after the ICV.

Yes___ No___ NA_X_

Comments: None.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met requirements.

Yes_X_ No___

Comments: None.

The continuing calibration blanks were run at 10% frequency.

Yes_X_ No___

Comments: Continuing calibration blanks were run every 10 samples.

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes_X_ No___

Comments: None.

All analyzed blanks were free of contamination.

Yes___ No_X_

Comments: The following table lists the blanks with contamination, elements present, affected samples, and data qualifiers.

Blank Contaminants

Blank ID	Date	Contaminant	Concentration Found in Blank (ug/L)	IDL (ug/L)	Associated Samples	Concentration Found in Sample (ug/filter)	Qualifier/ Adjustment
ICB	10/23/98	Cadmium	0.47	0.2	98-10-234-3 98-10-234-10	0.02 0.03	U
PB	10/26/98	Lead	1.3	1.0	98-10-234-21	0.20	

The blank results reported on the Form 3s were only reported to the CRDL rather than to the IDL. No elements were found above the CRDL. Therefore, the raw data were evaluated in order to obtain values above the IDL. The values reported above were taken from the raw data and above the IDL, but less than the CRDL.

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes_X_ No___

Comments: None.

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes_X_ No___

Comments: Arsenic, cadmium, and lead recoveries from the ICSAB solution were within QC criteria. ICSA data were not required for method 6010.

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: Because these samples are filters and only one filter for each sample was provided the laboratory could not perform a pre-digestion spike. Therefore, the post digestion spikes were evaluated as a pre-digestion spike.

The percent recoveries (%R) were calculated correctly.

$$\%\ Recovery = \frac{(SSR - SR)}{SA} \times 100$$

SSR = spiked sample result
SR = sample result
SA = spike added

Yes_X_ No___

Comments: None.

Spike recoveries were within the range of 75-125% (an exception is granted where the sample concentration is four times the spike concentration).

Yes_X_ No___

Comments: None.

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., Pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes___ No___ NA_X_

Comments: Post digestion spikes were evaluated as the matrix spikes.

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes___ No_X_

Comments: Duplicate data were performed using a laboratory control sample duplicate due to insufficient sample size. (One filter per sample.)

The RPDs were calculated correctly.

$$RPD = \frac{(S - D)}{(S + D)/2} \times 100$$

S = sample
D = duplicate

Yes_X_ No___

Comments: None.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes_X_ No___

Comments: None.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes_X_ No___

Comments: None.

XII. GFAA QC

Duplicate injections were performed on all GFAA samples and the RSD was within ± 20%.

Yes___ No___ NA_X_

Comments: None.

Analytical spikes were performed on all GFAA samples and the percent recovery was 85 - 115%.

Yes___ No___ NA_X_

Comments: None.

MSAs were analyzed when required and the correlation coefficient was > 0.995.

Yes___ No___ NA_X_

Comments: None.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

All results were within control limits.

Yes_X_ No___

Comments: None.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII.

Yes___ No___ NA_X_

Comments: None.

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes_X_ No___

Comments: None.

The serial dilution was without interference problems.

Yes_X_ No___

Comments: None.

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for all elements on the target analyte list.

Yes___ No_X_

Comments: The Form 10 in the data package did not report the correct IDLs. The correct Form 10 was obtained from SDG 98-10-306 ant attached to the worksheets.

Reported IDLs met requirements.

Yes_X_ No___

Comments: None.

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes_X_ No___

Comments: The interelement corrections provided were obtained more than a year prior to sample analysis. No action was required.

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes_X_ No___

Comments: The instrument linear ranges were not obtained within three months of sample analysis. No action was required.

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of ± 5% of the true value.

Yes___ No___ NA_X_

Comments: None.

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported on Form XIII.

Yes_X_ No___

Comments: None.

XXI. FORM 14 - ANALYSIS RUN LOG

A Form XIV with the required information was filled out for each analysis run in the data package.

Yes_X_ No___

Comments: None.

XXII. Additional Comments or Problems/Resolutions Not Addressed Above

Yes_X_ No___

Comments: Only the results for arsenic, camium and lead were reported on the Form 1s for the metal analyses.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both INORGANIC and ORGANIC DATA

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2000 47 N

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-1

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

TF 12/14/98

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2000 47 E

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-2

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

RF 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

2000 47 S

Lab Name: PARAGON_ANALYTICS Contract:

Lab Code: NA Case No.: SAS No.: SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-3

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	B		P
7439-92-1	Lead	0.10	U		P

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RF 12/14/16

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 N

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-4

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

BF 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 E

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-5

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.12	B		P

TF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 S

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-6

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

PG 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 N

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-7

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	J		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 E

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-8

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

R 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 S

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-9

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

RF 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 N

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-10

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.03	B		P
7439-92-1	Lead	0.10	U		P

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RF 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 E

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-11

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4691 V1 S

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-12

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.11	B		P

RF 12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4711 TH E

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-13

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4711 TH S

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-14

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

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Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4711 TH N

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-15

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

TF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940 ST S

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-16

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

TF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940 ST N

Lab Name: PARAGON_ANALYTICS Contract:

Lab Code: NA Case No.: SAS No.: SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-17

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

R 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940 ST E

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-18

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

RF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940 ST N

Lab Name: PARAGON_ANALYTICS Contract: _____

Lab Code: NA Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-19

Level (low/med): LOW Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

BF 12/14/98

Color Before: WHITE Clarity Before: N/A Texture: FINE

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

FORM I - IN

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940 ST S

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-20

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.10	U		P

12/14/98

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

4940 ST E

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

Matrix (soil/water): FILTER Lab Sample ID: 9810234-21

Level (low/med): LOW__ Date Received: 10/23/98

% Solids: 100.0

Concentration Units (ug/L or mg/kg dry weight): UG/FILTER

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	0.30	U		P
7440-43-9	Cadmium	0.02	U		P
7439-92-1	Lead	0.20	B		P

Color Before: WHITE____ Clarity Before: N/A___ Texture: FINE__

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

RF 12/14/98

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METAL ANALYSIS WORKSHEET---HOLDING TIMES

BATCH: 98-10-234

List all analytes which do not meet holding time criteria

LAB ID	SAMPLE ID	Matrix	PRE-SERVED Y/N	DATE COLLECTED	METALS ANALYSIS DATE/S	Hg CVAA ANALYSIS DATE	CN ANALYSIS DATE	ANALYSIS DATE/S	NO. OF DAYS PAST HOLDING TIME	ACTION
1	~~2000 47~~ 01	Filters	NA	10-17-98	10-23-98				-0-	None
2	~~E02~~									
3	803									
4	~~4691 01 0~~ 04			10-20						
5	~~E05~~									
6	06									
7	07			10-21						
8	08									
9	09									
10	10			10-22						
11	11									
12	12									
13	13			10-19						
14	14									
15	15									
16	16			10-20						
17	17									
18	18									
19	19			10-21	10-23-98					
20	20					~~[illegible]~~				
21	21				10/26					

COMMENTS For As, Cd, Pb
rec'd at 17°C

Actions:
1. If holding times are exceeded, all sample results are estimated (J)/(UJ).
2. If holding times are grossly exceeded (>= 2*holding time), detected results are estimated (J), and non-detected results are rejected (R).

Validated By: Bill F[illegible] Date: 12-14-98

Reviewed By: Amy Ballow Date: 12-17-98

ANALYTE	HOLDING TIME	PRESERVATIVE AQUEOUS	PRESERVATIVE SOIL
Metals	180 days	pH < 2 w/HNO3, 4 Deg. C	4 Deg. C
Mercury	28 days	pH < 2 w/HNO3, 4 Deg. C	4 Deg. C
Cyanide	14 days	pH > 12 w/NaOH, 4 Deg. C	4 Deg. C

Holding Time = Analysis Date -- Collection Date

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VERSION 2.0
SEPT. 1996

IIA METAL ANALYSIS WORKSHEET -- ICP CALIBRATIONS

BATCH: 98-10-24

List all ICP analytes that did not meet the percent recovery criteria for initial calibration verification (ICV) and continuing calibration verification (CCV).

ANALYTE	ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED
All within limits						✓

Was a CRDL check sample (CRI) analyzed at the beginning and at the end of each sample run? Yes No (N/A)

COMMENTS Not reported as non-CLP method requested non CLP

Actions:

ICV/CCV Actions:

	PERCENT RECOVERY				
	<75%	75-89%	90-110%	111-125%	>125%
Detected results	R	J	V	J	R
Non-detected Results	R	UJ	V	V	V

1. If the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).

IIB METAL ANALYSIS WORKSHEET -- AA CALIBRATIONS

BATCH: ____________

List all AA analytes that did not meet the percent recovery criteria for initial calibration verification (ICV) and continuing calibration verification (CCV).

ANALYTE	ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED
						NA

1. Were the correct number of standards and blanks used to calibrate the instrument? Yes No
2. Is the initial calibrations correlation coefficient > 0.995? Yes No
   If no, list affected analytes and samples.
3. Was a CRDL check sample (CRA) analyzed at the beginning of each sample run? Yes No

COMMENTS

Actions:

ICV/CCV Actions:

	PERCENT RECOVERY				
	<75%	75-89%	90-110%	111-125%	>125%
Detected results	R	J	V	J	R
Non-detected Results	R	UJ	V	V	V

1. If three standards and a blank were not used for initial calibration, or the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).
2. If the initial calibration correlation coefficient was less than 0.995 qualify sample results as estimated (J)/(UJ).

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IIC METAL ANALYSIS WORKSHEET -- Hg CALIBRATIONS

BATCH: ____________

List all mercury results that did not meet the percent recovery criteria for the ICV and/or CCV standards.

ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED
					N/A

1. Were the correct number of standards and blanks used to calibrate the instrument? Yes No

2. Is the initial calibration correlation coefficient > 0.995? Yes No

If no, list affected samples:

3. Was a CRDL check sample (CRA) analyzed at the beginning of each sample run? Yes No

COMMENTS

Actions:

	PERCENT RECOVERY				
	<65%	65-79%	80-120%	121-135%	>135%
Detected results	R	J	V	J	R
Non-detected results	R	UJ	V	V	V

1. If four standards and a blank were not used for initial calibration, or the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).
2. If the initial calibration correlation coefficient was less than 0.995, qualify sample results as estimated (J)/(UJ).

IID METAL ANALYSIS WORKSHEET -- CN CALIBRATIONS

BATCH: ____________________

List all cyanide results that did not meet the percent recovery criteria for the ICV and/or CCV standards.

ICV CCV	TRUE	FOUND	%R	ACTION	SAMPLES AFFECTED
					NA

1. Were the correct number of standards and blanks used to calibrate the instrument? Yes No
2. Is the initial calibration correlation coefficient > 0.995? Yes No
   If no, list affected samples:
3. Was a mid-range calibration standard and an ICV distilled? Yes No
   If no, list affected samples:

COMMENTS

Actions:

	PERCENT RECOVERY				
	<70%	70-84%	85-115%	116-130%	>130%
Detected results	R	J	V	J	R
Non-detected results	R	UJ	V	V	V

1. If three standards and a blank were not used for initial calibration, or the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).
2. If the initial calibration correlation coefficient was less than 0.995, qualify samples results as estimated (J)/(UJ).
3. If a mid-range standard (or ICV) was not distilled, qualify sample results as estimated (J)/(UJ).

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III METAL ANALYSIS WORKSHEET -- BLANKS

MATRIX: ug/L BATCH:

List the highest positive AND negative blank result >= |IDL| below. Use one worksheet for soil matrix and another for water matrix.

	ANALYTE	ICB CCB PB/MB	IDL	BLANK CONC.	5 * Bl. Conc.	ACTION	SAMPLES AFFECTED
10/23	Cd	ICB	0.2	0.47 ✓	2.35	U	9, 10
1450	Cd	CCB5	0.2	0.29 ✓			
		CCB6		0.32 ✓		see	ICB
		~~CCB1~~ CCB1		0.20			
10/26	Cd ~~Cd~~ ~~Pb~~	ICB	0.2	0.74 ✓	1.7	—	no hit in 21 ✓
(1220)	Pb	PB	1.0	1.3 ✓	6.5	U	21 ✓

) only for 21

	CRDL	IDL
As =	10	3.0
Cd =	5	0.2
Pb =	3	1.0

NOTE: Verify that the absolute value of any analyte concentration in the PB or MB is < CRDL.

COMMENTS Blanks not reported to IDL only to CRDL ✓
reviewed raw data for ICB, PB & CCBs bracketing
samples w/ hits

Actions:

1. If |Blank| < IDL, no action is taken.
2. If Blank >= IDL, then all sample results >= IDL and < 5*Blank are non-detected (U).
3. If Blank =< -IDL, all sample results >= IDL and < 5*|Blank| are estimated (J).
4. If Blank =< -IDL and raw data sample result is =< IDL then non-detected results are estimated (UJ).

(1252) 10/23 PB-OK
as well

(only 21 is w/ (10/26 PB) analysis)

met3/techlaw/policy7

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IVA METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: _____

NOTE: The sample results can be accepted without qualification, if the sample concentrations of Al, Ca, Fe, and Mg are less than or equal to the concentration found in the ICSA solution.

Examine the sample results in ug/l and list any Al, Ca, Fe, or Mg results that are greater than the ICSA values.

SAMPLE ID	ANALYTE	SAMPLE RESULT	ICS VALUE	COMMENTS

List any analytes in the ICS AB solution that did not meet the criteria of 80-120% R.

ANALYTE	% R	ACTION	SAMPLES AFFECTED
	w/in 80-120%		for As, Cd, Pb.

Were Interference Check Samples run at the beginning and end of each sample analysis run, or a minimum of twice per 8-hour shift (whichever is more frequent)? Yes No

COMMENTS

Actions:

	PERCENT RECOVERY			
	<50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

IVB METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: _____

Report the concentration of any analytes detected in the ICSA solution > |IDL| that should not be present.

ANALYTE	ICSA RESULT	ACTION	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT
	NA		For non-CLP				

Actions:

If the ICSA value > the positive IDL:
1. For non-detected results, no action is taken.
2. Estimate (J) all detected results < = 5*ICSA.

If the ICSA value < -IDL:
1. Estimate (J) detected results < = 5*|ICSA|.
2. Estimate (UJ) non-detected results.

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V METAL ANALYSIS WORKSHEET -- PRE-DIGESTION MATRIX SPIKE

MATRIX: filter BATCH: ____________

List all parameters that do not meet the percent recovery criteria. Note: The pre-digestion spike recovery criteria are not evaluated for Ca, Mg, K, Na, Al, and Fe for soil samples, and Ca, Mg, K, and Na for water samples.
If the sample result exceeds the spike added by a factor of 4 or more, no action is taken.

SAMPLE ID	ANALYTE	SPIKED SAMPLE RESULT	SAMPLE RESULT	SPIKE ADDED	% R	ACTION	SAMPLES AFFECTED
	Recoveries for	As,	Cd &	Pb	w/	limits	
	in	both	post	spike	1 &	21	

1. Was a pre-digestion matrix spike prepared at the required frequency of once every 20 samples, or every SDG (whichever is more frequent)? Yes (No)
2. Was a post-digestion matrix spike analyzed for all ICP elements, except Silver, that did not meet the pre-digestion matrix spike recovery criteria? Yes No Post spike only

COMMENTS

Lab analyzed post spikes only due to limited sample size (filter)

1. If any analyte does not meet the % R criteria, qualify all associated samples using the following criteria:
Actions:

	Percent Recovery			
	<30%	30-74%	75-125%	>125%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

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VI METAL ANALYSIS WORKSHEET -- LABORATORY DUPLICATES

MATRIX: Filters BATCH: ______

List all parameters that do not meet % difference or CRDL criteria.

SAMPLE ID	ANALYTE	SAMPLE VALUE	DUP. VALUE	RPD	DIFFERENCE	ACTION	SAMPLES AFFECTED
		LCS/LCSD	dups	w/in	20%.		

COMMENTS Performed on LCS/LCSD due to samples are filters - (1 filter/sample)

Actions:

1. AQUEOUS
If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 20%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > CRDL, estimate (J)/(UJ) all sample results of the same matrix.

2. SOLID
If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 35%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > 2*CRDL, estimate (J)/(UJ) all sample results of the same matrix.
*Difference = |Sample result - Duplicate sample result|

VII METAL ANALYSIS WORKSHEET--LABORATORY CONTROL SAMPLES

MATRIX: Solid BATCH: ______

List all parameters that do not meet the percent recovery criteria.

LCS ID	ANALYTE	TRUE VALUE	FOUND VALUE	% R	ACTION	SAMPLES AFFECTED
	LCS	recoveries	are	w/in	limits	/

COMMENTS

Actions:

Exception: antimony and silver have no control limits. An aqueous LCS is not required for CN and mercury.

	PERCENT RECOVERY			
1. AQUEOUS LCS	<50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

2. SOLID LCS

	BELOW CONTROL LIMITS	WITHIN CONTROL LIMITS	ABOVE CONTROL LIMITS
Detected results	J	V	J
Non-detected results	UJ	V	V

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VIIIA METAL ANALYSIS WORKSHEET -- ANALYTICAL SPIKE ANALYSIS

BATCH: ____________

List all samples whose analytical spike recovery did not meet the 85-115 % recovery criteria.

ANALYTE	SAMPLE ID	SAMPLE RESULT	SPIKED SAMPLE RESULT	TRUE SPIKE VALUE	%R	ACTION	COMMENT

NA

1. Spike Recovery: One point analytical spikes were performed for all GFAA samples? Yes No

COMMENTS

If the sample result is <50% of the spike result, or the sample result is >50% of the spike result* and the percent recovery is <40% or between 85-115%, the following apply.

Actions:	<10%	10-84%	85-115%	>115%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

(column heading: PERCENT RECOVERY)

*Spike result = |spiked sample result - sample result|

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VIIIB METAL ANALYSIS WORKSHEET -- FURNACE AA ANALYSIS

BATCH: _____

If the sample result is >= 50% of the spike result and the percent recovery was between 40-84% or >115%, then MSA must be performed.
List all samples for which an MSA analysis was required but not performed, or MSA results were outside control limits.

ANALYTE	SAMPLE ID	1st. CORR. COEFF.	2nd. CORR. COEFF.	ACTION	COMMENT

Actions:
1. Estimate (J) if an MSA was required and not performed.
2. If the correlation coefficient was <0.995, the MSA should be performed a second time. Estimate (J) all sample results if a reanalysis was not performed, or the reanalysis correlation coefficient was < 0.995, or result from the highest correlation coefficient was not reported.

List all samples > CRDL whose duplicate injections did not agree within 20% RSD or CV, or samples in which duplicate injections were not performed

ANALYTE	SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	%RSD or CV	CRDL	ACTION	COMMENT

*Spike result = |spiked sample result - sample result|

Actions:
1. Estimate (J) detected results greater than the CRDL if duplicate injections are outside 20% RSD.
2. Estimate (J) all sample results if duplicate injections were not performed.

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IX METAL ANALYSIS WORKSHEET — ICP SERIAL DILUTION ANALYSIS

MATRIX: Filter BATCH: _____

Serial dilution criteria only applies if the original sample result is at least 50*IDL and %D >10%.

ANALYTE	IDL	50*IDL	SAMPLE RESULT	SERIAL DILUTION RESULT	%D	ACTION	SAMPLES AFFECTED

No hits ≥ 50*IDL

none

INDUCTIVELY COUPLED PLASMA SERIAL DILUTION ANALYSIS:

Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis. Yes No

Serial dilutions were not performed for the following:

COMMENTS SD on Sample 1 & 21

Actions:
Estimate (J) detected results if %D is > 10%.

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X METAL ANALYSIS WORKSHEET -- SAMPLE RESULT VERIFICATION

BATCH: ______________

1. Describe any raw data anomalies (i.e. baseline shifts, negative absorbances, transcription or calculation errors, legibility, etc.)

2. List results that fall outside the linear range of the ICP Instrument or the calibrated range of the AA or Cyanide Instrument and were not reanalyzed.

3. Were ICP linear ranges obtained within 3 months of, and preceding, the sample analyses? - Yes (No) NA w/in 3 mont

4. Were ICP interelement corrections obtained within 12 months of, and preceding, the sample analyses? Yes (No) NA

just over 1 year

5. Were instrument detection limits present, found to be less than or equal to the CRDL, and obtained within 3 monts of, and preceeding the sample analyses? (Yes) (No) NA ~~Not w/in 3 months~~ 2/1/98 — 10/23

~~IDL = CRDL~~

6. Were all sample results reported down to the IDL? (Yes) No ~~IDL = CRDL~~ (1)

7. Were sample weights, volumes, percent solids, and dilutions used correctly when reporting the results? Yes No

COMMENTS

New Form 10 found in other SDG 98-10-306

(1) Lab was requested to resubmit Form 1s w/ results reported to the IDL. However, the Form 3s for blanks were only reported to CRDL. (used raw data) # 10 & new Form 10 was not provided we was found in SDG 98-10-306.

As. IDL = 3.0 ug/L $3.0\ ug/L \times \frac{0.1L}{1\ Filter} = 0.3\ ug/Filter$

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10

Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA_61E_4___ Date: 10/15/98

Flame AA ID Number : _____

Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Arsenic	189.04		10	3.0	P
Cadmium	226.50		5	0.2	P
Lead	220.35		3	1.0	P

Comments: Copied from SDG 98-10-306 RF 12/14/98

FORM X - IN

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Instrument Detection Limits (Quarterly)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA_61E_____ Date: 02/01/98

Flame AA ID Number : _____

Furnace AA ID Number : _____

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Arsenic	189.04		10	10.0	P
Cadmium	226.50		5	5.0	P
Lead	220.35		3	3.0	P

Comments:

FORM X - IN

U.S. EPA - CLP

11A

ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E_____ Date: 10/01/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : Al	Ca	Fe	Mg	BA_
Arsenic	189.04	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.50	0.0000000	0.0000000	0.0000600	0.0000000	0.0000000
Lead	220.35	0.0003640	-0.0000130	0.0000630	0.0000110	0.0000000

Comments:

FORM XI (Part 1) - IN

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11B

ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E_____ Date: 10/01/97

Analyte	Wave-length (nm)	Interelement Correction Factors for : CO_	CR_	MN_	NI_	V__
Arsenic	189.04	0.0000000	-0.0029800	0.0000000	0.0000000	0.0000000
Cadmium	226.50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.35	-0.0018800	0.0000000	0.0001820	0.0002430	0.0000000

Comments:

FORM XI (Part 2) - IN

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ICP LINEAR RANGES (QUARTERLY)

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.: VASQUE

ICP ID Number: TJA 61E_____ Date: 02/01/98

Analyte	Integ. Time (sec.)	Concentration (ug/L)	M
Arsenic	15.00	10000.0	P
Cadmium	15.00	10000.0	P
Lead	15.00	10000.0	P

Comments:

FORM XII - IN

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PREPARATION LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.:_____ SAS No.: _____ SDG No.:VASQUE

Method: P_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
2000 47	10/23/98	1.00	100
2000 47	10/23/98	1.00	100
2000 47	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4691 V1	10/23/98	1.00	100
4711 TH	10/23/98	1.00	100
4711 TH	10/23/98	1.00	100
4711 TH	10/23/98	1.00	100
4940 ST	10/23/98	1.00	100
4940 ST	10/23/98	1.00	100
4940 ST	10/23/98	1.00	100
4940 ST	10/23/98	1.00	100
4940 ST	10/23/98	1.00	100
4940 ST	10/23/98	1.00	100
LCSS	10/23/98	1.00	100
LCSS	10/23/98	1.00	100
LCSSD	10/23/98	1.00	100
LCSSD	10/23/98	1.00	100
PBS	10/23/98	1.00	100
PBS	10/23/98	1.00	100

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ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:VASQUE

Instrument ID Number: TJA 61E_____ Method: P_

Start Date: 10/23/98 End Date: 10/23/98

EPA Sample No.	D/F	Time	% R	Analytes																								
				AS	CD	PB																						
MIX	1.00	0932		X	X	X																						
MIX	1.00	0934		X	X	X																						
ICV	1.00	0939		X	X	X																						
ICB	1.00	0944		X	X	X																						
ZZZZZZ	1.00	0946																										
ICSA	1.00	0949		X	X	X																						
ICSAB	1.00	0952		X	X	X																						
CCV	1.00	0954		X	X	X																						
CCB	1.00	1001		X	X	X																						
ZZZZZZ	1.00	1004																										
ZZZZZZ	1.00	1006																										
ZZZZZZ	1.00	1009																										
ZZZZZZ	1.00	1016																										
ZZZZZZ	1.00	1018																										
ZZZZZZ	5.00	1021																										
ZZZZZZ	1.00	1024																										
ZZZZZZ	1.00	1026																										
ZZZZZZ	1.00	1031																										
ZZZZZZ	1.00	1033																										
CCV	1.00	1036		X	X	X																						
CCB	1.00	1039		X	X	X																						
ZZZZZZ	1.00	1042																										
ZZZZZZ	1.00	1044																										
ZZZZZZ	1.00	1047																										
ZZZZZZ	1.00	1050																										
ZZZZZZ	1.00	1052																										
ZZZZZZ	1.00	1055																										
ZZZZZZ	1.00	1057																										
ZZZZZZ	1.00	1100																										
ZZZZZZ	1.00	1103																										
ZZZZZZ	1.00	1105																										
CCV	1.00	1108		X	X	X																						

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:VASQUE

Instrument ID Number: TJA 61E_____ Method: P_

Start Date: 10/23/98 End Date: 10/23/98

EPA Sample No.	D/F	Time	% R	Analytes																											
				AS	CD	PB																									
CCB	1.00	1112		X	X	X																									
ZZZZZZ	1.00	1114																													
ZZZZZZ	1.00	1117																													
ZZZZZZ	1.00	1122																													
ZZZZZZ	1.00	1124																													
ZZZZZZ	5.00	1127																													
ZZZZZZ	1.00	1129																													
ZZZZZZ	1.00	1132																													
ZZZZZZ	1.00	1137																													
ZZZZZZ	1.00	1139																													
ZZZZZZ	1.00	1142																													
CCV	1.00	1144		X	X	X																									
CCB	1.00	1148		X	X	X																									
ZZZZZZ	1.00	1151																													
ZZZZZZ	1.00	1153																													
ZZZZZZ	5.00	1156																													
ZZZZZZ	1.00	1159																													
ZZZZZZ	1.00	1201																													
ZZZZZZ	1.00	1207																													
ZZZZZZ	1.00	1213																													
ZZZZZZ	1.00	1216																													
CCV	1.00	1219		X	X	X																									
CCB	1.00	1224		X	X	X																									
CCV	1.00	1446		X	X	X																									
CCB	1.00	1450		X	X	X																									
PBS	1.00	1452		X	X	X																									
LCSS	1.00	1455		X	X	X																									
LCSSD	1.00	1458		X	X	X																									
2000 47	1.00	1502		X	X	X																									
2000 47	5.00	1505		X	X	X																									
2000 47	1.00	1507		X	X	X																									
2000 47	1.00	1512		X	X	X																									

FORM XIV - IN

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:VASQUE

Instrument ID Number: TJA 61E_____ Method: P_

Start Date: 10/23/98 End Date: 10/23/98

EPA Sample No.	D/F	Time	% R	Analytes																										
				AS	CD	PB																								
2000 47	1.00	1515		X	X	X																								
4691 V1	1.00	1517		X	X	X																								
4691 V1	1.00	1520		X	X	X																								
CCV	1.00	1522		X	X	X																								
CCB	1.00	1526		X	X	X																								
4691 V1	1.00	1529		X	X	X																								
4691 V1	1.00	1531		X	X	X																								
4691 V1	1.00	1534		X	X	X																								
4691 V1	1.00	1537		X	X	X																								
4691 V1	1.00	1539		X	X	X																								
4691 V1	1.00	1542		X	X	X																								
4691 V1	1.00	1544		X	X	X																								
4711 TH	1.00	1547		X	X	X																								
4711 TH	1.00	1550		X	X	X																								
4711 TH	1.00	1552		X	X	X																								
CCV	1.00	1555		X	X	X																								
CCB	1.00	1559		X	X	X																								
4940 ST	1.00	1602		X	X	X																								
4940 ST	1.00	1604		X	X	X																								
4940 ST	1.00	1607		X	X	X																								
4940 ST	1.00	1609		X	X	X																								
4940 ST	1.00	1612		X	X	X																								
ZZZZZZ	1.00	1618																												
ICSA	1.00	1621		X	X	X																								
ICSAB	1.00	1623		X	X	X																								
CCV	1.00	1626		X	X	X																								
CCB	1.00	1630		X	X	X																								

FORM XIV - IN

U.S. EPA - CLP

14

ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS_____ Contract: _____

Lab Code: NA____ Case No.: _____ SAS No.: _____ SDG No.:VASQUE

Instrument ID Number: TJA 61E_____ Method: P_

Start Date: 10/26/98 End Date: 10/26/98

EPA Sample No.	D/F	Time	% R	Analytes																										
				AS	CD	PB																								
MIX	1.00	1150		X	X	X																								
MIX	1.00	1152		X	X	X																								
ICV	1.00	1155		X	X	X																								
ICB	1.00	1201		X	X	X																								
ZZZZZZ	1.00	1204																												
ICSA	1.00	1206		X	X	X																								
ICSAB	1.00	1209		X	X	X																								
CCV	1.00	1212		X	X	X																								
CCB	1.00	1217		X	X	X																								
PBS	1.00	1220		X	X	X																								
LCSS	1.00	1223		X	X	X																								
LCSSD	1.00	1225		X	X	X																								
4940 ST	1.00	1230		X	X	X																								
4940 ST	5.00	1233		X	X	X																								
4940 ST	1.00	1235		X	X	X																								
ZZZZZZ	10.00	1239																												
ZZZZZZ	50.00	1242																												
ZZZZZZ	50.00	1246																												
ZZZZZZ	10.00	1249																												
CCV	1.00	1252		X	X	X																								
CCB	1.00	1256		X	X	X																								
ZZZZZZ	10.00	1258																												
ZZZZZZ	1.00	1301																												
ZZZZZZ	5.00	1304																												
ZZZZZZ	1.00	1306																												
ZZZZZZ	10.00	1311																												
ZZZZZZ	10.00	1322																												
ZZZZZZ	500.00	1325																												
ZZZZZZ	1.00	1329																												
ZZZZZZ	1.00	1334																												
ZZZZZZ	1.00	1336																												
CCV	1.00	1339		X	X	X																								

FORM XIV - IN

U.S. EPA - CLP

14
ANALYSIS RUN LOG

Lab Name: PARAGON_ANALYTICS________ Contract: ___________

Lab Code: NA____ Case No.: ______ SAS No.: ______ SDG No.:VASQUE

Instrument ID Number: TJA 61E______ Method: P_

Start Date: 10/26/98 End Date: 10/26/98

EPA Sample No.	D/F	Time	% R	Analytes: AS	CD	PB
CCB	1.00	1343		X	X	X

FORM XIV - IN

300 UNION BOULEVARD, SUITE 600, LAKEWOOD, CO 80228

TECHLAW INC.

PHONE: (303) 763-7188
FAX: (303) 763-4896

December 21, 1998

Ms. Lori Raschke
URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202

RE: Transmittal of Data Validation Report
Vasquez and I-70
TDD No. 75-80914
Report No. 302244

Dear Ms. Raschke:

Please find the enclosed data validation report for TDD No. 75-80914 for the Vasquez and I-70 project. This report is for the validation of five filter samples for metals (arsenic, cadmium, and lead) analyses by SW-846 methods.

If you have any questions regarding the enclosed report, please contact me at (303) 763-7188.

Yours sincerely,
TECHLAW, INC.

Lisa Burnley
Associate Consultant

enclosure
IF: 0252-176

REGION VIII
SUMMARY OF DATA QUALITY ASSURANCE REVIEW
INORGANIC

TDD No.	Site Name		Operable Unit
75-80914	Vasquez & I-70		
RPM/OSC Name			
Pete Stevenson			
Contractor Laboratory	**Contract No.**	**Report No.**	**Laboratory DPO/Region**
Quanterra, Inc.	OS-98-P-5436	302244	

Review Assigned Date December 2, 1998 Data Validator Bill Fear
Review Completion Date December 21, 1998 Report Reviewer Amy Ballow

Sample ID	Laboratory ID	Matrix	Analysis
ND-FC-01	302244-0001	Filter	Metals (Arsenic, Cadmium, and Lead) by SW-846 Method 6010B
ND-FC-02	302244-0002		
ND-FC-03	302244-0003		
ND-FC-04	302244-0004		
ND-FC-05	302244-0012		

DATA QUALITY STATEMENT

(X) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
( ) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes _____ No ___X___

TPO Attention Required? Yes _____ No ___X___ If yes, list the items that require attention:

INORGANIC DATA QUALITY ASSURANCE REVIEW

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, modified for the method used. Qualification taken on sample results based on the Functional Guidelines that differ from method requirement are identified within the report.

The data package TDD No.75-80914, Report No. 302244, consisted of 5 filter samples for arsenic, cadmium, and lead analyses by SW-846 Method 6010B.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
None	None	None	None	None

Method/SOW Number SW-846, Method 6010
Revision B

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets
P Initial Calibration and Calibration Verification Results
P Continuing Calibration Verification Results
NA CRDL Standard for ICP and AA
P Blank Analysis Results
P ICP Interference Check Sample Results
NP Spiked Sample Results
NA Post-digest spiked Sample Analysis
P Duplicate Sample Results
NP Instrument Detection Limits
P Laboratory Control Sample results
NA Standard Addition Results
NA ICP Serial Dilution Results
NA Holding Times Summary Sheet
NP ICP Interelement Correction Factors
NP ICP Linear Ranges
P Raw Data

P Samples	P Calibration Standards	P Blanks	NP Spikes
P Duplicates	P ICP QC (ICS and Serial Dilution	P LCS	
NA Furnace AA	NA Mercury Analysis	NA Cyanide Analysis	

NA Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs
P Analysis Run Log
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required by the SOW
R = Provided as Resubmission
NP = Not provided in original data package or as resubmission
NR = Not required under the SOW
NA = Not applicable to this data package or analysis

I. DELIVERABLES

All deliverables were present.

Yes___ No_X_

Comments: The summary forms provided for the calibrations, blanks, and interference check samples did not correspond to the raw data. Therefore, the raw data were used to evaluate this data. Matrix spike analyses could not performed on these filter samples.

II. HOLDING TIMES AND PRESERVATION CRITERIA

All holding times and preservations criteria were met.

Yes_X_ No___

Comments: The samples were analyzed within holding times. No shipping or receiving problems were noted.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to requirements.

Yes_X_ No___

Comments: None.

The instruments were calibrated daily and each time an analysis run was performed.

Yes_X_ No___

Comments: None.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes_X_ No___

Comments: None.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes_X_ No___

Comments: None.

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met requirements.

Yes_X_ No___

Comments: None.

The calibration verification results were within 90-110% recovery for metals, 85-115% for cyanide, and 80-120% for mercury.

Yes_X_ No___

Comments: None.

The continuing calibration standards were run at 10% frequency.

Yes_X_ No___

Comments: None.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes___ No___ NA_X_

Comments: A CRDL standard was not required for method 6010.

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes___ No___ NA_X_

Comments: None.

The CRI and/or the CRA were analyzed after the ICV.

Yes___ No___ NA_X_

Comments: A CRI was analyzed but the data were not summarized as this analysis was not required for this method.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met requirements.

Yes_X_ No___

Comments: None.

The continuing calibration blanks were run at 10% frequency.

Yes_X_ No___

Comments: Continuing calibration blanks were run every 10 samples.

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes_X_ No___

Comments: None.

All analyzed blanks were free of contamination.

Yes_X_ No___

Comments: None.

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes_X_ No___

Comments: None.

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes_X_ No___

Comments: Arsenic, cadmium, and lead recoveries from the ICSAB solution were within QC criteria. No action was required for the ICSA analysis

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes___ No_X_

Comments: Matrix spike analyses were not performed. Apparently, because these samples are filters and only one filter for each sample was provided, the laboratory could not perform matrix spike analyses. The laboratory analyzed two laboratory control samples to evaluate the data for accuracy.

The percent recoveries (%R) were calculated correctly.

$$\%\ Recovery = \frac{(SSR - SR)}{SA} \times 100$$

SSR = spiked sample result
SR = sample result
SA = spike added

Yes___ No___ NA_X_

Comments: None.

Spike recoveries were within the range of 75-125% (an exception is granted where the sample concentration is four times the spike concentration).

Yes___ No___ NA_X_

Comments: Matrix spike analyses could not be performed due to insufficient sample amounts.

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., Pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes___ No___ NA_X_

Comments: Post digestion spikes were not performed.

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes___ No_X_

Comments: Duplicate data were performed using a laboratory control sample duplicate due to insufficient sample size. (One filter per sample.)

The RPDs were calculated correctly.

$$RPD = \frac{(S - D)}{(S + D)/2} \times 100$$

S = sample
D = duplicate

Yes_X_ No___

Comments: None.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes_X_ No___

Comments: None.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes_X_ No___

Comments: None.

XII. GFAA QC

Duplicate injections were performed on all GFAA samples and the RSD was within ± 20%.

Yes___ No___ NA_X_

Comments: None.

Analytical spikes were performed on all GFAA samples and the percent recovery was 85 - 115%.

Yes___ No___ NA_X_

Comments: None.

MSAs were analyzed when required and the correlation coefficient was > 0.995.

Yes___ No___ NA_X_

Comments: None.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

All results were within control limits.

Yes_X_ No___

Comments: None.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII.

Yes___ No___ NA_X_

Comments: None.

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes_X_ No___

Comments: A serial dilution was performed, however, the serial dilution data were not reported or required as cadmium, lead, and arsenic were reported as non-detected in the original sample analyses.

The serial dilution was without interference problems.

Yes_X_ No___

Comments: None.

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for all elements on the target analyte list.

Yes___ No_X_

Comments: Only the reporting limits were provided. IDLs and CRDLs were not provided for these 6010 analyses.

Reported IDLs met requirements.

Yes_X_ No___

Comments: Required IDLs were not provided for validation.

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes___ No_X_

Comments: The interelement corrections provided were not provided. Interference was evaluated using the interference check samples.

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes___ No___ NA_X_

Comments: The instrument linear ranges were not provided or required as all samples results were below the reporting limits.

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of ± 5% of the true value.

Yes___ No___ NA_X_

Comments: None.

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported on Form XIII.

Yes_X_ No___

Comments: A digestion log was provided.

XXI. FORM 14 - ANALYSIS RUN LOG

A Form XIV with the required information was filled out for each analysis run in the data package.

Yes_X_ No___

Comments: Instrument run logs were provided.

XXII. Additional Comments or Problems/Resolutions Not Addressed Above

Yes_X_ No___

Comments: Only the results for arsenic, cadmium and lead were reported on the Form 1s for theses filter metal analyses.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both INORGANIC and ORGANIC DATA

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: ND-FC-01
Lab ID: 302244-0001-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 22 OCT 98
Authorized: 22 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	22 OCT 98	22 OCT 98
Cadmium	ND	total ug	0.20	6010B	22 OCT 98	22 OCT 98
Lead	ND	total ug	2.0	6010B	22 OCT 98	22 OCT 98

ND = Not detected
NA = Not applicable

RF 12/21/98

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: ND-FC-02
Lab ID: 302244-0002-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 22 OCT 98
Authorized: 22 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	22 OCT 98	22 OCT 98
Cadmium	ND	total ug	0.20	6010B	22 OCT 98	22 OCT 98
Lead	ND	total ug	2.0	6010B	22 OCT 98	22 OCT 98

ND = Not detected
NA = Not applicable

RF 12/21/98

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: ND-FC-03
Lab ID: 302244-0003-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 22 OCT 98
Authorized: 22 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	22 OCT 98	22 OCT 98
Cadmium	ND	total ug	0.20	6010B	22 OCT 98	22 OCT 98
Lead	ND	total ug	2.0	6010B	22 OCT 98	22 OCT 98

AF 12/4/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: ND-FC-04
Lab ID: 302244-0004-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 22 OCT 98
Authorized: 22 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	22 OCT 98	22 OCT 98
Cadmium	ND	total ug	0.20	6010B	22 OCT 98	22 OCT 98
Lead	ND	total ug	2.0	6010B	22 OCT 98	22 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: ND-FC-05
Lab ID: 302244-0005-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 22 OCT 98
Authorized: 22 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	22 OCT 98	22 OCT 98
Cadmium	ND	total ug	0.20	6010B	22 OCT 98	22 OCT 98
Lead	ND	total ug	2.0	6010B	22 OCT 98	22 OCT 98

RF 12/21/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

TECHLAW, INC.

VERSIO
SEPT. 9

I METAL ANALYSIS WORKSHEET--HOLDING TIMES

302244

BATCH: [redacted] Of 12/11/98

List all analytes which do not meet holding time criteria

	SAMPLE ID	Matrix	PRE-SERVED Y/N	DATE COLLECTED	METALS ANALYSIS DATE/S	Hg CVAA ANALYSIS DATE	CN ANALYSIS DATE	_____ ANALYSIS DATE/S	NO. OF DAYS PAST HOLDING TIME	ACTIO
1	NO-FC-01	Soil	NA	10-15-98	11-22-98				~0~	
2	-02									
3	-03									
4	-04			10-14						
5	-05			10-16						

COMMENTS

Actions:
1. If holding times are exceeded, all sample results are estimated (J)/(UJ).
2. If holding times are grossly exceeded (>= 2*holding time), detected results are estimated (J), and non-detected results are rejected (R).

Validated By: [redacted] Date: 12/11/98

Reviewed By: AMY BALLOW Date: 12-21-98

ANALYTE	HOLDING TIME	PRESERVATIVE	
		AQUEOUS	SOIL
Metals	180 days	pH < 2 w/HNO3, 4 Deg. C	4 Deg. C
Mercury	28 days	pH < 2 w/HNO3, 4 Deg. C	4 Deg. C
Cyanide	14 days	pH > 12 w/NaOH, 4 Deg. C	4 Deg. C

Holding Time = Analysis Date - Collection Date

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IIA METAL ANALYSIS WORKSHEET -- ICP CALIBRATIONS

BATCH: 302244

List all ICP analytes that did not meet the percent recovery criteria for initial calibration verification (ICV) and continuing calibration verification (CCV).

ANALYTE	ICV CCV	TRUE	FOUND	%R	ACTION	SAMPLES AFFECTED
As	ICV	1.0	1.031	103	—	
Cr	"	"	1.055	106	—	
Pb	"	"	1.064	106	—	
						Used Raw Data
As	CCV 1343	5.0	4.98	100	—	
Cr	"	"	5.031	101	—	
Pb	"	"	4.995	100	—	
						None out
As	CCV 1493	5.0	4.84	97	—	
Cr	"	"	4.993	100	—	
Pb	"	"	4.94	99	—	

Was a CRDL check sample (CRI) analyzed at the beginning and at the end of each sample run? Yes No (NA) non CLP

COMMENTS Forms in book not for this data
Used raw data to evaluate ccvs

Actions:

ICV/CCV Actions:

	PERCENT RECOVERY				
	<75%	75-89%	90-110%	111-125%	>125%
Detected results	R	J	V	J	R
Non-detected Results	R	UJ	V	V	

1. If the instrument was not calibrated daily and each time the instrument was set up qualify the data as rejected (R).

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III METAL ANALYSIS WORKSHEET -- BLANKS

MATRIX: Solid / Filter BATCH: 302244

List the highest positive AND negative blank result >= |IDL| below. Use one worksheet for soil matrix and another for water matrix.

ANALYTE	ICB CCB PB/MB	IDL	BLANK CONC.	5 * Bl. Conc.	ACTION	SAMPLES AFFECTED
	ICB		U			
	CCB 1347		U		None	
	PB		U			
	CCB 1436		U			
						100 soil + filters

NOTE: Verify that the absolute value of any analyte concentration in the PB or MB is < CRDL.

COMMENTS Forms incorrect IDL ✓

Actions:

1. If |Blank| < IDL, no action is taken.
2. If Blank >= IDL, then all sample results >= IDL and < 5*Blank are non-detected (U).
3. If Blank =< -IDL, all sample results >= IDL and < 5*|Blank| are estimated (J).
4. If Blank =< -IDL and raw data sample result is =< IDL then non-detected results are estimated (UJ).

Raw Data IDLs of Soils calculated using soil Filter RLs

AS 0.1

Cd 0.005

Pb 0.05

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IVA METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: 302244

NOTE: The sample results can be accepted without qualification, if the sample concentrations of Al, Ca, Fe, and Mg are less than or equal to the concentration found in the ICSA solution.

Examine the sample results in ug/l and list any Al, Ca, Fe, or Mg results that are greater than the ICSA values.

SAMPLE ID	ANALYTE	SAMPLE RESULT	ICS VALUE	COMMENTS
		6010		
	NA			
				None ✓

List any analytes in the ICS AB solution that did not meet the criteria of 80 – 120% R.

ANALYTE	%R	ACTION	SAMPLES AFFECTED
Al	113 / 109		
Ca	83 89	None	all 80-120%
Pb	89 85		

Were Interference Check Samples run at the beginning and end of each sample analysis run, or a minimum of twice per 8-hour shift (whichever is more frequent)? (Yes) No

COMMENTS

Actions:

	PERCENT RECOVERY			
	<50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

used Raw for ICSB
true 1.0

IVB METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: ____________

Report the concentration of any analytes detected in the ICSA solution > |IDL| that should not be present.

ANALYTE	ICSA RESULT	ACTION	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT
			NA				

Actions:

If the ICSA value > the positive IDL:
1. For non-detected results, no action is taken.
2. Estimate (J) all detected results <= 5*ICSA.

If the ICSA value < -IDL:
1. Estimate (J) detected results <= 5*|ICSA|.
2. Estimate (UJ) non-detected results.

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V METAL ANALYSIS WORKSHEET -- PRE-DIGESTION MATRIX SPIKE

MATRIX: Filters BATCH: 102244

List all parameters that do not meet the percent recovery criteria. Note: The pre-digestion spike recovery criteria are not evaluated for Ca, Mg, K, Na, Al, and Fe for soil samples, and Ca, Mg, K, and Na for water samples. If the sample result exceeds the spike added by a factor of 4 or more, no action is taken.

SAMPLE ID	ANALYTE	SPIKED SAMPLE RESULT	SAMPLE RESULT	SPIKE ADDED	% R	ACTION	SAMPLES AFFECTED
		See LCS for accuracy ✓					

1. Was a pre-digestion matrix spike prepared at the required frequency of once every 20 samples, or every SDG (whichever is more frequent)? Yes (No)
2. Was a post-digestion matrix spike analyzed for all ICP elements, except Silver, that did not meet the pre-digestion matrix spike recovery criteria? Yes (No)

COMMENTS

✓ Filters NO MS/MSD lab analyzed LCS/LCSD

1. If any analyte does not meet the % R criteria, qualify all associated samples using the following criteria:

Actions:

	Percent Recovery			
	<30%	30-74%	75-125%	>125%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

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VI METAL ANALYSIS WORKSHEET -- LABORATORY DUPLICATES

MATRIX: f-ller BATCH: R02244

List all parameters that do not meet % difference or CRDL criteria.

SAMPLE ID	ANALYTE	SAMPLE VALUE	DUP. VALUE	RPD	DIFFERENCE	ACTION	SAMPLES AFFECTED
		Dup performed on			LCS /	LCS D	

COMMENTS

Actions:

1. AQUEOUS
If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 20%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > CRDL, estimate (J)/(UJ) all sample results of the same matrix.

2. SOLID
If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 35%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > 2*CRDL, estimate (J)/(UJ) all sample results of the same matrix.
*Difference = |Sample result - Duplicate sample result|

VII METAL ANALYSIS WORKSHEET--LABORATORY CONTROL SAMPLES

MATRIX: Filter

BATCH: 302244

List all parameters that do not meet the percent recovery criteria.

LCS ID	ANALYTE	TRUE VALUE	FOUND VALUE	% R	ACTION	SAMPLES AFFECTED
	LCS w/in LCS limits					✓

COMMENTS

Also ran on LCSD RPD < 20%.

Actions:

Exception: antimony and silver have no control limits. An aqueous LCS is not required for CN and mercury.

1. AQUEOUS LCS	PERCENT RECOVERY <50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

2. SOLID LCS	BELOW CONTROL LIMITS	WITHIN CONTROL LIMITS	ABOVE CONTROL LIMITS
Detected results	J	V	J
Non-detected results	UJ	V	V

VIIA METAL ANALYSIS WORKSHEET -- ANALYTICAL SPIKE ANALYSIS

BATCH: ____________

List all samples whose analytical spike recovery did not meet the 85-115 % recovery criteria.

ANALYTE	SAMPLE ID	SAMPLE RESULT	SPIKED SAMPLE RESULT	TRUE SPIKE VALUE	%R	ACTION	COMMENT

1. Spike Recovery: One point analytical spikes were performed for all GFAA samples? Yes No

COMMENTS

If the sample result is <50% of the spike result, or the sample result is >50% of the spike result* and the percent recovery is <40% or between 85-115%, the following apply.

		PERCENT RECOVERY		
Actions:	<10%	10-84%	85-115%	>115%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

*Spike result = |spiked sample result - sample result|

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VIIIB METAL ANALYSIS WORKSHEET -- FURNACE AA ANALYSIS

BATCH: _____

If the sample result is >= 50% of the spike result and the percent recovery was between 40-84% or >115%, then MSA must be performed.
List all samples for which an MSA analysis was required but not performed, or MSA results were outside control limits.

ANALYTE	SAMPLE ID	1st. CORR. COEFF.	2nd. CORR. COEFF.	ACTION	COMMENT

Actions:
1. Estimate (J) if an MSA was required and not performed.
2. If the correlation coefficient was <0.995, the MSA should be performed a second time. Estimate (J) all sample results if a reanalysis was not performed, or the reanalysis correlation coefficient was < 0.995, or result from the highest correlation coefficient was not reported.

List all samples > CRDL whose duplicate injections did not agree within 20% RSD or CV, or samples in which duplicate injections were not performed

ANALYTE	SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	%RSD or CV	CRDL	ACTION	COMMENT

*Spike result = |spiked sample result - sample result|

Actions:
1. Estimate (J) detected results greater than the CRDL if duplicate injections are outside 20% RSD.
2. Estimate (J) all sample results if duplicate injections were not performed.

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IX METAL ANALYSIS WORKSHEET -- ICP SERIAL DILUTION ANALYSIS

MATRIX: Fish BATCH: 302244

Serial dilution criteria only applies if the original sample result is at least 50*IDL and %D >10%.

ANALYTE	IDL	50*IDL	SAMPLE RESULT	SERIAL DILUTION RESULT	% D	ACTION	SAMPLES AFFECTED
No hits							

INDUCTIVELY COUPLED PLASMA SERIAL DILUTION ANALYSIS:

Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis. (Yes) No At 4X but no hits in

Serial dilutions were not performed for the following: Sample thus SD not required.

COMMENTS (ie no hits > 50*)

Actions:
Estimate (J) detected results if %D is > 10%.

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X METAL ANALYSIS WORKSHEET -- SAMPLE RESULT VERIFICATION

BATCH: 30224

1. Describe any raw data anomalies (i.e. baseline shifts, negative absorbances, transcription or calculation errors, legibility, etc.)

none

2. List results that fall outside the linear range of the ICP instrument or the calibrated range of the AA or Cyanide instrument, and were not reanalyzed.

none

3. Were ICP linear ranges obtained within 3 months of, and preceding, the sample analyses? - Yes (No) NA Not provided but results

4. Were ICP interelement corrections obtained within 12 months of, and preceding, the sample analyses? Yes (No) NA

not provided

5. Were instrument detection limits present, found to be less than or equal to the CRDL, and obtained within 3 monts of, and preceeding, the sample analyses? Yes (No) NA only provided RL values in ug/filter

IDLs on pg 71

6. Were all sample results reported down to the IDL? Yes No ?--

7. Were sample weights, volumes, percent solids, and dilutions used correctly when reporting the results? Yes No

no units

COMMENTS

1 filter → 40 ml

Raw data in mg/L

x mg/L x ~~mg/L~~
ug/ml x 40 ml

As = 0.1 mg/L
Cd = 0.005
Pb = 0.05

REGION VIII
SUMMARY OF DATA QUALITY ASSURANCE REVIEW
INORGANIC

TDD No.	Site Name		Operable Unit
75-80914	Vasquez & I-70		
RPM/OSC Name			
Pete Stevenson			
Contractor Laboratory	**Contract No.**	**Report No.**	**Laboratory DPO/Region**
Quanterra, Inc.	OS-98-P-5436	302114	

Review Assigned Date December 2, 1998 Data Validator Bill Fear
Review Completion Date December 21, 1998 Report Reviewer Amy Ballow

Sample ID	Laboratory ID	Matrix	Analysis
200047N-10-15	302114-0001	Filter	Metals (Arsenic, Cadmium, and Lead) by SW-846 Method 6010B
200047E-10-15	302114-0002		
200047S-10-15	302114-0003		
4711THN-10-15	302114-0004		
4711THE-10-15	302114-0005		
4711THS-10-15	302114-0006		
200047N-10-16	302114-0007		
200047E-10-16	302114-0008		
200047S-10-16	302114-0009		
4711THN-10-16	302114-0010		
4711THE-10-16	302114-0011		
4711THS-10-16	302114-0012		

DATA QUALITY STATEMENT

(X) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
( ) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes _____ No ___X____

TPO Attention Required? Yes _____ No ___X____ If yes, list the items that require attention:

INORGANIC DATA QUALITY ASSURANCE REVIEW

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, modified for the method used. Qualification taken on sample results based on the Functional Guidelines that differ from method requirement are identified within the report.

The data package TDD No.75-80914, Report No. 302114, consisted of 12 filter samples for arsenic, cadmium, and lead analyses by SW-846 Method 6010B.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
None	None	None	None	None

Method/SOW Number SW-846, Method 6010
Revision 0.0

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets
P Initial Calibration and Calibration Verification Results
P Continuing Calibration Verification Results
NA CRDL Standard for ICP and AA
P Blank Analysis Results
P ICP Interference Check Sample Results
NP Spiked Sample Results
NA Post-digest spiked Sample Analysis
P Duplicate Sample Results
NP Instrument Detection Limits
P Laboratory Control Sample results
NA Standard Addition Results
NA ICP Serial Dilution Results
NA Holding Times Summary Sheet
NP ICP Interelement Correction Factors
NP ICP Linear Ranges
P Raw Data

P Samples	P Calibration Standards	P Blanks	NP Spikes
P Duplicates	P ICP QC (ICS and Serial Dilution	P LCS	
NA Furnace AA	NA Mercury Analysis	NA Cyanide Analysis	

NA Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs
P Analysis Run Log
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required by the SOW
R = Provided as Resubmission
NP = Not provided in original data package or as resubmission
NR = Not required under the SOW
NA = Not applicable to this data package or analysis

I. DELIVERABLES

All deliverables were present.

Yes___ No_X_

Comments: Appropriate data were provided for method 6010 analyses. However, matrix spike analyses could not performed on these filter samples.

II. HOLDING TIMES AND PRESERVATION CRITERIA

All holding times and preservations criteria were met.

Yes_X_ No___

Comments: The samples were analyzed within holding times. No shipping or receiving problems were noted.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to requirements.

Yes_X_ No___

Comments: None.

The instruments were calibrated daily and each time an analysis run was performed.

Yes_X_ No___

Comments: None.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes_X_ No___

Comments: None.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes_X_ No___

Comments: None.

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met requirements.

Yes_X_ No___

Comments: None.

The calibration verification results were within 90-110% recovery for metals, 85-115% for cyanide, and 80-120% for mercury.

Yes_X_ No___

Comments: None.

The continuing calibration standards were run at 10% frequency.

Yes_X_ No___

Comments: None.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes___ No___ NA_X_

Comments: A CRDL standard was not required for method 6010.

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes___ No___ NA_X_

Comments: None.

The CRI and/or the CRA were analyzed after the ICV.

Yes___ No___ NA_X_

Comments: A CRI was analyzed but the data were not summarized as this analysis was not required for this method.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met requirements.

Yes_X_ No___

Comments: None.

The continuing calibration blanks were run at 10% frequency.

Yes_X_ No___

Comments: Continuing calibration blanks were run every 10 samples.

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes_X_ No___

Comments: None.

All analyzed blanks were free of contamination.

Yes_X_ No___

Comments: None.

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes_X_ No___

Comments: None.

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes_X_ No___

Comments: Arsenic, cadmium, and lead recoveries from the ICSAB solution were within QC criteria. No action was required for the ICSA analysis.

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes___ No_X_

Comments: Matrix spike analyses were not performed. Apparently because these samples are filters and only one filter for each sample was provided, the laboratory could not perform matrix spike analyses. The laboratory analyzed two laboratory control samples to evaluate the data for accuracy.

The percent recoveries (%R) were calculated correctly.

$$\%\ Recovery = \frac{(SSR - SR)}{SA} \times 100$$

SSR = spiked sample result
SR = sample result
SA = spike added

Yes___ No___ NA_X_

Comments: None.

Spike recoveries were within the range of 75-125% (an exception is granted where the sample concentration is four times the spike concentration).

Yes___ No___ NA_X_

Comments: Matrix spike analyses could not be performed due to insufficient sample amounts.

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., Pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes___ No___ NA_X_

Comments: Post digestion spikes were not performed.

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes____ No_X_

Comments: Duplicate data were performed using a laboratory control sample duplicate due to insufficient sample size. (One filter per sample.)

The RPDs were calculated correctly.

$$RPD = \frac{(S - D)}{(S + D)/2} X\ 100$$

S = sample
D = duplicate

Yes_X_ No___

Comments: None.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes_X_ No___

Comments: None.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes_X_ No___

Comments: None.

XII. GFAA QC

Duplicate injections were performed on all GFAA samples and the RSD was within ± 20%.

Yes___ No___ NA_X_

Comments: None.

Analytical spikes were performed on all GFAA samples and the percent recovery was 85 - 115%.

Yes___ No___ NA_X_

Comments: None.

MSAs were analyzed when required and the correlation coefficient was > 0.995.

Yes___ No___ NA_X_

Comments: None.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes_X_ No___

Comments: None.

All results were within control limits.

Yes_X_ No___

Comments: None.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII.

Yes___ No___ NA_X_

Comments: None.

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes_X_ No___

Comments: A serial dilution was performed, however, the serial dilution data were not reported or required as cadmium, lead, and arsenic were reported as non-detected in the original sample analyses.

The serial dilution was without interference problems.

Yes_X_ No___

Comments: None.

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for all elements on the target analyte list.

Yes___ No_X_

Comments: Only the reporting limits were provided. IDLs and CRDLs were not provided for these 6010 analyses.

Reported IDLs met requirements.

Yes_X_ No___

Comments: Required IDLs were not provided for validation.

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes___ No_X_

Comments: The interelement corrections were not provided. Interference was evaluated using the interference check samples.

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes___ No___ NA_X_

Comments: The instrument linear ranges were not provided or required as all samples results were below the reporting limits.

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of ± 5% of the true value.

Yes___ No___ NA_X_

Comments: None.

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported on Form XIII.

Yes_X_ No___

Comments: A digestion log was provided.

XXI. FORM 14 - ANALYSIS RUN LOG

A Form XIV with the required information was filled out for each analysis run in the data package.

Yes_X_ No___

Comments: Instrument run logs were provided.

XXII. Additional Comments or Problems/Resolutions Not Addressed Above

Yes_X_ No___

Comments: Only the results for arsenic, cadmium, and lead were reported on the Form 1s for theses filter metal analyses.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both INORGANIC and ORGANIC DATA

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 200047N-10-15
Lab ID: 302114-0001-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

12/19/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 200047E-10-15
Lab ID: 302114-0002-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

The cover letter is an integral part of this report.
Rev 230787

Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 200047S-10-15
Lab ID: 302114-0003-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 4711THN-10-15
Lab ID: 302114-0004-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

DF=2/1/6

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 4711THE-10-15
Lab ID: 302114-0005-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 4711THS-10-15
Lab ID: 302114-0006-SA
Matrix: FILTER Sampled: 15 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

RF 12/19/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 200047N-10-16
Lab ID: 302114-0007-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 200047E-10-16
Lab ID: 302114-0008-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

12/1/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 200047S-10-16
Lab ID: 302114-0009-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

12/18/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 4711THN-10-16
Lab ID: 302114-0010-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

12/19/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 4711THE-10-16
Lab ID: 302114-0011-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

R-21111r

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

The cover letter is an integral part of this report.
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Quanterra

Total Metals

Client Name: URS Operating Services, Inc.
Client ID: 4711THS-10-16
Lab ID: 302114-0012-SA
Matrix: FILTER Sampled: 16 OCT 98 Received: 19 OCT 98
Authorized: 19 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	total ug	4.0	6010B	19 OCT 98	19 OCT 98
Cadmium	ND	total ug	0.20	6010B	19 OCT 98	19 OCT 98
Lead	ND	total ug	2.0	6010B	19 OCT 98	19 OCT 98

RF 12/16/98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: John Barnett

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TECHLAW, INC.

VERSI[illegible]
SEPT[illegible]

I METAL ANALYSIS WORKSHEET--HOLDING TIMES

BATCH: 302114

List all analytes which do not meet holding time criteria

	SAMPLE ID	Matrix	PRE-SERVED Y/N	DATE COLLECTED	METALS ANALYSIS DATE/S	Hg CVAA ANALYSIS DATE	CN ANALYSIS DATE	______ ANALYSIS DATE/S	NO. OF DAYS PAST HOLDING TIME	ACT[illegible]
1	200047N-10-15			10-15 ✓	10-19-98				-0-	
2	E									
3	S									
4	4711THN									
5	E									
6	S									
7	200047N-10-16			10-14 ✓						
8	E									
9	S									
10	4711ThN									
11	E									
12	S									

Coc in[illegible]

COMMENTS ~~[illegible]~~ rec'd in good condition ✓

Actions:
1. If holding times are exceeded, all sample results are estimated (J)/(UJ).
2. If holding times are grossly exceeded (>= 2*holding time), detected results are estimated (J), and non-detected results are rejected (R).

Validated By: Bill F[illegible] Date:

Reviewed By: Amy O Byllaw 12/21/98 Date:

L Bu[illegible] 12/21/98

ANALYTE	HOLDING TIME	PRESERVATIVE AQUEOUS	SOIL
Metals	180 days	pH < 2 w/HNO3, 4 Deg. C	4 Deg. C
Mercury	28 days	pH < 2 w/HNO3, 4 Deg. C	4 Deg. C
Cyanide	14 days	pH > 12 w/NaOH, 4 Deg. C	4 Deg. C

Holding Time = Analysis Date - Collection Date

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IIA METAL ANALYSIS WORKSHEET -- ICP CALIBRATIONS

BATCH: _____

List all ICP analytes that did not meet the percent recovery criteria for initial calibration verification (ICV) and continuing calibration verification (CCV).

ANALYTE	ICV CCV	TRUE	FOUND	% R	ACTION	SAMPLES AFFECTED
	ICV		w/	90-110%	-	
	CCVs		w/	90-110%		
						None

Was a CRDL check sample (CRI) analyzed at the beginning and at the end of each sample run? Yes No (NA)

COMMENTS

non CLP

Actions:

ICV/CCV Actions:

	PERCENT RECOVERY				
	<75%	75-89%	90-110%	111-125%	>125%
Detected results	R	J	V	J	R
Non-detected Results	R	UJ	V	V	V

1. If the instrument was not calibrated daily and each time the instrument was set up, qualify the data as rejected (R).

III METAL ANALYSIS WORKSHEET -- BLANKS

MATRIX: Filter BATCH: ______

List the highest positive AND negative blank result >= |IDL| below. Use one worksheet for soil matrix and another for water matrix.

ANALYTE	ICB CCB PB/MB	IDL	BLANK CONC.	5 * Bl. Conc.	ACTION	SAMPLES AFFECTED
	ICB		4		—	
	CCB		4		—	
	PB		4		—	

NOTE: Verify that the absolute value of any analyte concentration in the PB or MB is < CRDL.

COMMENTS

Actions:

1. If |Blank| < IDL, no action is taken.
2. If Blank >= IDL, then all sample results >= IDL and < 5*Blank are non-detected (U).
3. If Blank =< -IDL, all sample results >= IDL and < 5*|Blank| are estimated (J).
4. If Blank =< -IDL and raw data sample result is =< IDL then non-detected results are estimated (UJ).

As - 0.1
Cd - 0.005
Pb - 0.05

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IVA METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: _____

NOTE: The sample results can be accepted without qualification, if the sample concentrations of Al, Ca, Fe, and Mg are less than or equal to the concentration found in the ICSA solution.

Examine the sample results in ug/l and list any Al, Ca, Fe, or Mg results that are greater than the ICSA values.

SAMPLE ID	ANALYTE	SAMPLE RESULT	ICS VALUE	COMMENTS
	none			

List any analytes in the ICS AB solution that did not meet the criteria of 80-120% R.

ANALYTE	% R	ACTION	SAMPLES AFFECTED
wl	50-120%	for	As, c d, pb

Were Interference Check Samples run at the beginning and end of each sample analysis run, or a minimum of twice per 8-hour shift (whichever is more frequent)? (Yes) No

COMMENTS

Actions:

	PERCENT RECOVERY			
	<50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

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IVB METAL ANALYSIS WORKSHEET -- ICP INTERFERENCE CHECK SAMPLE

BATCH: ____________

Report the concentration of any analytes detected in the ICSA solution > |IDL| that should not be present

ANALYTE	ICSA RESULT	ACTION	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT	SAMPLE/ RESULT
	NA						

Actions:

If the ICSA value > the positive IDL:
1. For non-detected results, no action is taken.
2. Estimate (J) all detected results <= 5*ICSA.

If the ICSA value < -IDL:
1. Estimate (J) detected results <= 5*|ICSA|.
2. Estimate (UJ) non-detected results.

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V METAL ANALYSIS WORKSHEET -- PRE-DIGESTION MATRIX SPIKE

MATRIX: Filter BATCH: _____

List all parameters that do not meet the percent recovery criteria. Note: The pre-digestion spike recovery criteria are not evaluated for Ca, Mg, K, Na, Al, and Fe for soil samples, and Ca, Mg, K, and Na for water samples. If the sample result exceeds the spike added by a factor of 4 or more, no action is taken.

SAMPLE ID	ANALYTE	SPIKED SAMPLE RESULT	SAMPLE RESULT	SPIKE ADDED	% R	ACTION	SAMPLES AFFECTED
		See	LCS	&	LCSD	for	✓
			accuracy				

1. Was a pre-digestion matrix spike prepared at the required frequency of once every 20 samples, or every SDG (whichever is more frequent)? Yes (No)
2. Was a post-digestion matrix spike analyzed for all ICP elements, except Silver, that did not meet the pre-digestion matrix spike recovery criteria? Yes No

COMMENTS

NO MS/MSD due to insufficient sample
1 filter / sample

1. If any analyte does not meet the % R criteria, qualify all associated samples using the following criteria:

Actions:

	Percent Recovery			
	<30%	30-74%	75-125%	>125%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

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VI METAL ANALYSIS WORKSHEET -- LABORATORY DUPLICATES

MATRIX: Soil

BATCH: _____

List all parameters that do not meet % difference or CRDL criteria.

SAMPLE ID	ANALYTE	SAMPLE VALUE	DUP. VALUE	RPD	DIFFERENCE	ACTION	SAMPLES AFFECTED
	As			36		~~Adm~~	
	Cd			9.6			
	Pb			0			

COMMENTS: RPDs from LCS - LCSD as insuff. sample to be a matrix spike

Actions:

1. AQUEOUS

If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 20%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > CRDL, estimate (J)/(UJ) all sample results of the same matrix.

2. SOLID

If sample value > 5*CRDL, estimate (J) all sample results of the same matrix if the RPD is > 35%.
If sample value < 5*CRDL, and the difference between the duplicate and the original is > 2*CRDL, estimate (J)/(UJ) all sample results of the same matrix.
*Difference = |Sample result - Duplicate sample result|

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VII METAL ANALYSIS WORKSHEET--LABORATORY CONTROL SAMPLES

MATRIX: filter

BATCH: ______

List all parameters that do not meet the percent recovery criteria.

LCS ID	ANALYTE	TRUE VALUE	FOUND VALUE	% R	ACTION	SAMPLES AFFECTED
	Ag			95		
	Cr			104	All within lab limits	
	Pb			100		

COMMENTS

Actions:

Exception: antimony and silver have no control limits. An aqueous LCS is not required for CN and mercury.

1. AQUEOUS LCS	PERCENT RECOVERY <50%	50-79%	80-120%	>120%
Detected results	R	J	V	J
Non-detected results	R	UJ	V	V

2. SOLID LCS	BELOW CONTROL LIMITS	WITHIN CONTROL LIMITS	ABOVE CONTROL LIMITS
Detected results	J	V	J
Non-detected results	UJ	V	V

VIIIA METAL ANALYSIS WORKSHEET -- ANALYTICAL SPIKE ANALYSIS

BATCH: ____________

List all samples whose analytical spike recovery did not meet the 85-115 % recovery criteria.

ANALYTE	SAMPLE ID	SAMPLE RESULT	SPIKED SAMPLE RESULT	TRUE SPIKE VALUE	%R	ACTION	COMMENT

1. Spike Recovery: One point analytical spikes were performed for all GFAA samples? Yes No

COMMENTS

If the sample result is <50% of the spike result, or the sample result is >50% of the spike result* and the percent recovery is <40% or between 85-115%, the following apply.

Actions:	PERCENT RECOVERY <10%	10-84%	85-115%	>115%
Detected results	J	J	V	J
Non-detected results	R	UJ	V	V

*Spike result = |spiked sample result - sample result|

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VIIIB METAL ANALYSIS WORKSHEET -- FURNACE AA ANALYSIS

BATCH: _____

If the sample result is >= 50% of the spike result and the percent recovery was between 40-84% or >115%, then MSA must be performed.
List all samples for which an MSA analysis was required but not performed, or MSA results were outside control limits.

ANALYTE	SAMPLE ID	1st. CORR. COEFF.	2nd. CORR. COEFF.	ACTION	COMMENT

Actions:
1. Estimate (J) if an MSA was required and not performed.
2. If the correlation coefficient was <0.995, the MSA should be performed a second time. Estimate (J) all sample results if a reanalysis was not performed, or the reanalysis correlation coefficient was < 0.995, or result from the highest correlation coefficient was not reported.

List all samples > CRDL whose duplicate injections did not agree within 20% RSD or CV, or samples in which duplicate injections were not performed

ANALYTE	SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	%RSD or CV	CRDL	ACTION	COMMENT

*Spike result = |spiked sample result - sample result|

Actions:
1. Estimate (J) detected results greater than the CRDL if duplicate injections are outside 20% RSD.
2. Estimate (J) all sample results if duplicate injections were not performed.

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IX METAL ANALYSIS WORKSHEET --- ICP SERIAL DILUTION ANALYSIS

MATRIX: Fsh. BATCH: ____________

Serial dilution criteria only applies if the original sample result is at least 50*IDL and %D >10%.

ANALYTE	IDL	50*IDL	SAMPLE RESULT	SERIAL DILUTION RESULT	%D	ACTION	SAMPLES AFFECTED
Analyzed one at 4x but							
not reported as all sample							
results are ND (%D NA as < 50 x IDL)							

INDUCTIVELY COUPLED PLASMA SERIAL DILUTION ANALYSIS:

Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis. Yes (circled) No

Serial dilutions were not performed for the following:

COMMENTS

Actions:

Estimate (J) detected results if %D is > 10%.

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X METAL ANALYSIS WORKSHEET -- SAMPLE RESULT VERIFICATION

BATCH: _____

1. Describe any raw data anomalies (i.e. baseline shifts, negative absorbances, transcription or calculation errors, legibility, etc.)

2. List results that fall outside the linear range of the ICP instrument or the calibrated range of the AA or Cyanide instrument, and were not reanalyzed.

3. Were ICP linear ranges obtained within 3 months of, and preceding, the sample analyses? - Yes (No) NA Not provided but might

4. Were ICP interelement corrections obtained within 12 months of, and preceding, the sample analyses? Yes (No) NA

5. Were instrument detection limits present, found to be less than or equal to the CRDL, and obtained within 3 monts of, and preceeding, the sample analyses? Yes No NA only IRLs provided

6. Were all sample results reported down to the IDL? Yes No

7. Were sample weights, volumes, percent solids, and dilutions used correctly when reporting the results? Yes No

COMMENTS

As- 0.1 mg/L x 40mL = 4 ug (Filter